Imagine COMMUNICATIONS™

Installation and Operation Manual

Neo® DVR-3901

Digital Video Recorder

Edition E

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Publication Information

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DVR-3901

Digital Video Recorder

Installation and Operation Manual

Edition E
August 2005

LEITCH

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Preface

Manual Information

Purpose

This manual details the features, installation, operation, maintenance, and specifications of the NEO™ DVR-3901 Digital Video Recorder.

Audience

This manual is written for engineers, technicians and operators responsible for the installation, setup, maintenance, and operation of the NEO™ DVR-3901 Digital Video Recorder.

Revision History

Table P-1. Revision History

Edition	Date	Revision History
Edition A	December 2003	Initial Release
Edition B	February 2004	Addition of NeoVR Control Center Lite CD-ROM and installation instructions for Adobe Acrobat Reader®
Edition C	July 2004	New material: • Off-line media transfer through FTP • UDP control through Ethernet • Audio level control • Video level and hue controls • On-screen display (OSD) added to monitoring video, showing time code, operation status, and audio meter • Built-in frame synchronizer in EE mode
Edition D	March 2005	• Addition of DvrPlyCtrl and DvrRecCtrl parameter • Minor corrections to content
Edition E	August 2005	Replaced 40 GB hard drive with 80 GB hard drive

Writing Conventions

This manual adheres to the following writing conventions.

Table P-2. Writing Conventions

Term or Convention	Description
Bold	Indicates dialog box, property sheet, field, button, check box, list box, combo box, menu, submenu, window, list, and selection names
Italics	Indicates email addresses, names of books and publications, and first instances of new terms and specialized words that need emphasis
CAPS	Indicates a specific key on the keyboard, such as ENTER, TAB, CTRL, ALT, DELETE
`Code`	Indicates variables or command-line entries, such as a DOS entry or something you type into a field
>	Indicates the direction of navigation through a hierarchy of menus and windows.
hyperlink	Indicates a jump to another location within the electronic document or elsewhere
Internet address	Indicates a jump to a Web site or URL
Note	Indicates important information that helps to avoid and troubleshoot problems

Obtaining Leitch Documents

Installation, navigation, configuration, and setup information is now included in the *NEO FR-3901, FR-3903, and FR-3923 Mounting Frames Installation and Operation Manual*. If your current NEO frame manual is Edition A, B, C, or D, you will need to download an updated version from the Leitch Web site to access this information.

Leitch documents can be viewed or downloaded from the Leitch Web site at www.leitch.com (go to **Support>Documentation**). Alternatively, contact your Leitch customer service representative to request a document.

Unpacking the Module

Before you install and configure NEO modules, follow these steps:

1. Check the equipment for any visible damage that may have occurred during transit.
2. Confirm that you have received all items listed on the packing list.
3. Remove the anti-static shipping pouch, if present, and all other packaging material.
4. Retain the original packaging materials for possible reuse.
5. Contact your Leitch sales representative if parts are missing or damaged.

Keep at least one set of original packaging in the event that a product needs to be returned for service. If the original package is not available, you can purchase replacement packaging from Leitch Technology. Otherwise, you can supply your own packaging as long as it meets the following criteria:

- The packaging must be able to withstand the product's weight.
- The product must be held rigid within the packaging.
- There must be at least two inches (five centimeters) of space between the product and the container.
- The corners of the product must be protected.

If the product is still within the warranty period, Leitch Technology will return it to you by prepaid shipment after servicing.

Safety Standards and Compliances

See the *NEO Safety Instructions and Standards Manual* to find the safety standards and compliances for this NEO series product. A safety manual is shipped with every *FR-3901, FR-3903, and FR-3923 Mounting Frames Installation and Operation Manual* and can be downloaded from the Leitch Web site at www.leitch.com. Alternatively, contact your Leitch customer service representative for a copy of this safety manual.

Safety Terms and Symbols

This manual uses the following safety terms and symbols. See your *NEO Safety Instructions and Precautions Guide* for more information.

Table P-3. Safety Terms and Symbols Used in Manual

	WARNING: Statements identifying conditions or practices that can result in personal injury or loss of life: High voltage is present. Uninsulated dangerous voltage within the product's enclosure may be sufficient to constitute a risk of electric shock to persons.
	CAUTION: Statements identifying conditions or practices that can result in damage to the equipment or other property: Important operating and maintenance (servicing) instructions in the literature accompanying the product.

Restriction on Hazardous Substances (RoHS) Directive

Directive 2002/95/EC—commonly known as the European Union (EU) Restriction on Hazardous Substances (RoHS)—sets limits on the use of certain substances found in electrical and electronic equipment. The intent of this legislation is to reduce the amount of hazardous chemicals that may leach out of landfill sites or otherwise contaminate the environment during end-of-life recycling. The Directive takes effect on July 1, 2006, and it refers to the following hazardous substances:

- Lead (Pb)
- Mercury (Hg)
- Cadmium (Cd)
- Hexavalent Chromium (Cr-V1)
- Polybrominated Biphenyls (PBB)
- Polybrominated Diphenyl Ethers (PBDE)

In accordance with this EU Directive, all Leitch Technology products sold in the European Union will be fully RoHS-compliant and "lead-free." (See the Leitch Web site, www.leitch.com, for more information on dates and deadlines for compliance.) Spare parts supplied for the repair and upgrade of equipment sold before July 1, 2006 are exempt from the legislation. Leitch equipment that complies with the EU directive will be marked with a RoHS-compliant symbol, as shown in Figure 1.

Figure 1. RoHS Compliance Symbol

Waste from Electrical and Electronic Equipment (WEEE) Directive

The European Union (EU) Directive 2002/96/EC on Waste from Electrical and Electronic Equipment (WEEE) deals with the collection, treatment, recovery, and recycling of electrical and electronic waste products. The objective of the WEEE Directive is to assign the responsibility for the disposal of associated hazardous waste to either the producers or users of these products. Effective August 13, 2005, producers or users will be required to recycle electrical and electronic equipment at end of its useful life, and must not dispose of the equipment in landfills or by using other unapproved methods. (Some EU member states may have different deadlines.)

In accordance with this EU Directive, Leitch Technology International, Inc. and other companies selling electric or electronic devices in the EU will affix labels indicating that such products must be properly recycled. (See the Leitch Web site, www.leitch.com, for more information on dates and deadlines for compliance.) Contact your local Leitch sales representative for information on returning these products for recycling. Leitch equipment that complies with the EU directive will be marked with a WEEE-compliant symbol, as shown in Figure 2.

Figure 2. WEEE Compliance Symbol

Chapter 1

Introduction

Overview

The DVR-3901 module is a digital video recorder designed for NEO 1RU and 3RU rack-mounted frames, but that occupies only a single slot.

This chapter covers the following topics:

- "Product Description" on page 2
- "Main Features" on page 3
- "Front and Back Modules" on page 4
- "Back Module" on page 5
- "Signal Flow" on page 6
- "Function Descriptions" on page 7
- "Operation Modes" on page 9
- "NEO-VR Command Center™ Application" on page 10

Note

Installation, navigation, configuration, and setup information is now included in the *NEO FR-3901, FR-3903, and FR-3923 Mounting Frames Installation and Operation Manual*. If your current NEO frame manual is Edition A, B, C, or D, you will need to download an updated version from the Leitch Web site (www.leitch.com) to access this information.

See the *FR-3901, FR-3903, and FR-3923 Installation and Operation Manual* for information about NEO frames. The frame manual includes information about these items:

- General information about module unpacking, installation, removal, navigation, configuration, and setup
- Card-edge screen savers
- State recovery parameters
- Fan modules
- Resource modules
- Alarm interconnect modules
- Power supplies
- Servicing instructions

Product Description

Note

In Europe and Asia the 2.5 in. (6.35 cm) hard drive is described as 9.5 mm.

The NEO DVR-3901 Digital Video Recorder is a multifunction digital video recorder that can, in many applications, replace a VTR. It is designed to complement the modular line of video, audio, and signal processing products available for use in the NEO frame. The DVR-3901 comes with a front module, a back module, and two fixed 2.5 in. (6.35 cm) IDE hard drives that are mounted on the NEO DVR front module.

The DVR-3901 comes with a VFD display at the front edge of the card. This display provides a way for you to locally monitor and control the operation of this module.

Main Features

These are the main features of the DVR-3901 module:

- Disk-based video recorder that provides instant access to any video frame stored on the disk
- Recording and playback like a VTR, with support for slow motion, variable speed playback, and jog and shuttle
- Two operation modes: Playlist mode and BVW/Odetics mode
- Two 80 GB onboard 2.5 in. (6.35 cm) IDE hard drives that can operate in drive-spanning Merged Mode
- Motion JPEG compression for storage with compression ratios ranging from 4:1 to 10:1
- One channel video and one stereo audio recording/playback (not simultaneously)
- Video line standards: 525 and 625
- SDI Video input and output
- AES and embedded audio input and output
- LTC input and output
- NTSC and PAL-B monitoring video standards, with on-screen display of time code, operation status, and audio meter. The audio meter can be either a VU meter or a PPM meter
- Monitoring mono/mixed audio on 1 RCA jack
- Genlock to reference video or SDI video input
- Video and audio processing-and-amplifier (proc amps) for recording path and playback path
- Built-in video frame synchronizer in EE mode
- Sony 9-pin VTR Protocol via RS-422
- UDP control over ethernet
- Capability for configuration and status via both the card edge interface and Leitch CCS software
- 10/100 Ethernet connection for compressed video file transfer in or out of the disk

Note

Older versions of DVR-3901 shipped with two 40 GB hard drives.

Front and Back Modules

Front Module

NEO front modules are designated by the suffix "-FM." For example, the front module of the DVR-3901 is the "DVR-3901-FM." Figure 1-1 illustrates the position of the LEDs and card-edge controls on the DVR-3901-FM.

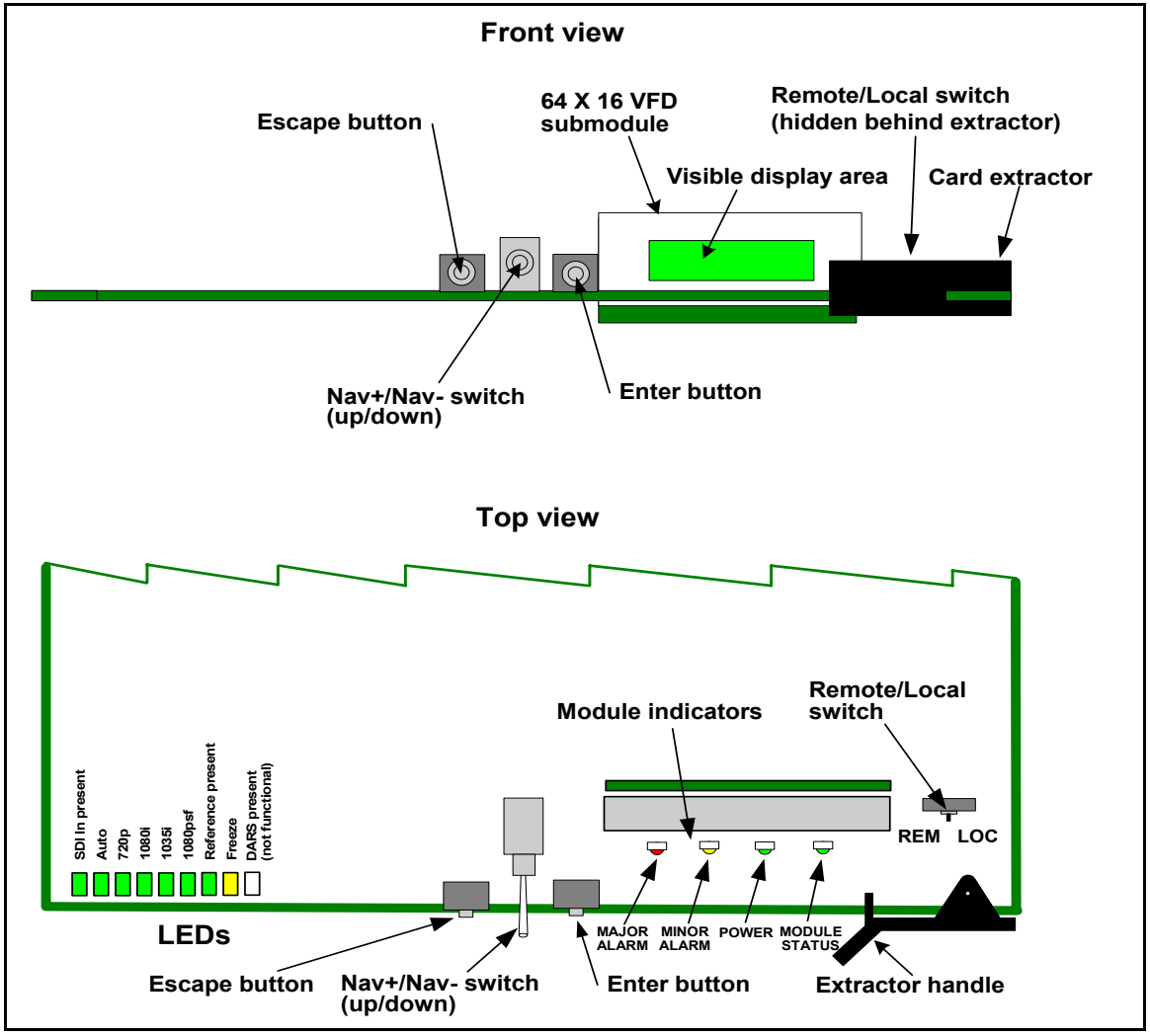

Figure 1-1. Front Module of the DVR-3901

Back Module

In the NEO frame, back modules are placed directly behind the front modules. Back modules are designated by the suffix "-BM." For example, the back module of the DVR-3901 is the "DVR-3901-BM." The back module connections are shown below.

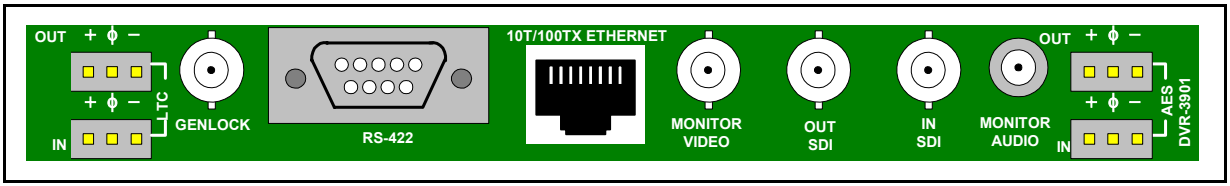

Figure 1-2. DVR-3901-BM Back Module

Signal Flow

Figure 1-3 is a functional block diagram of the DVR-3901 module.

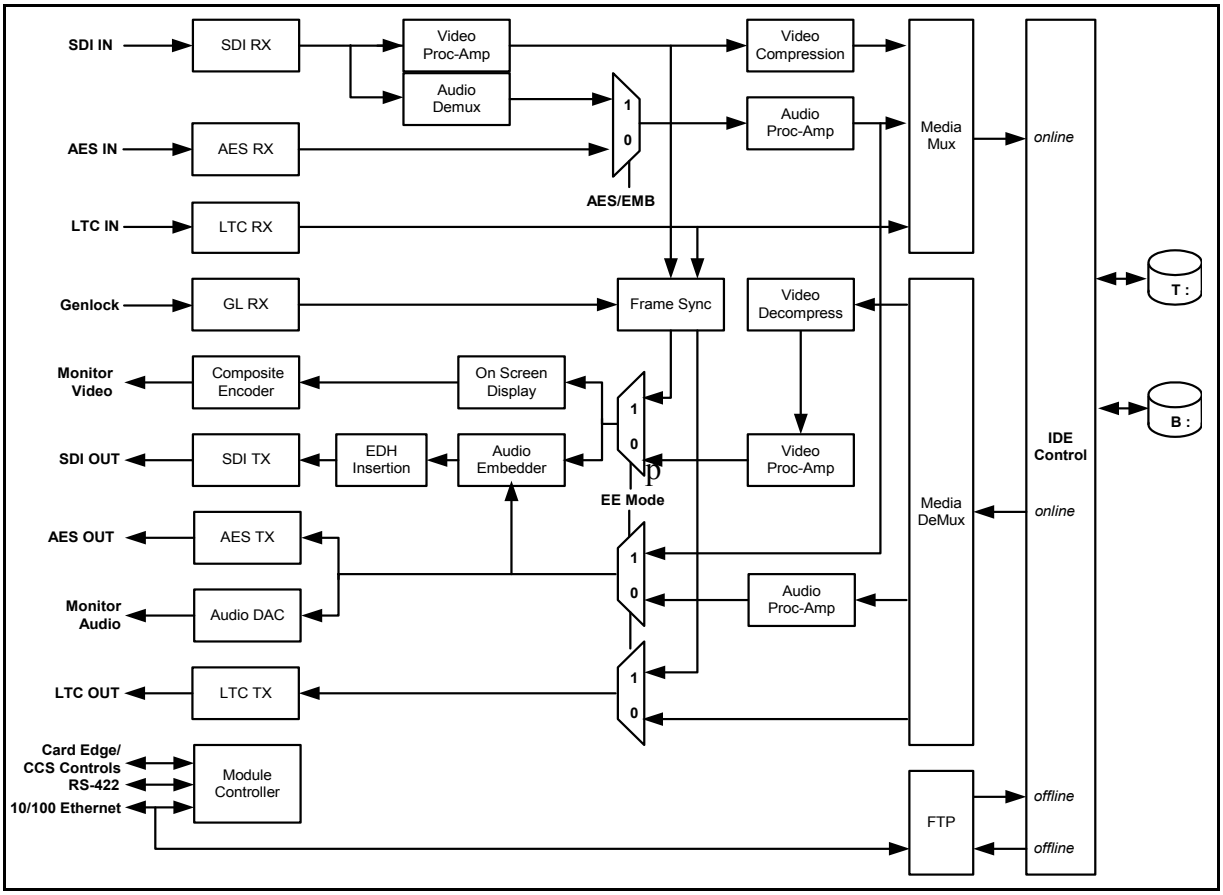

Figure 1-3. Functional Block Diagram of the DVR-3901 Module

Function Descriptions

The primary video and audio interfaces of the DVR-3901 are digital. Analog video and audio outputs are provided for monitoring purposes. "Functions and Controls" on page 57 provides more details about the functions and controls.

Video

The DVR-3901 supports one digital video channel, that is, one SDI in and one SDI out. (One composite video output is provided for monitoring purposes.) You can select between 525 or 625 line format for the video system. Video proc amps are available on recording and playback. Use the proc amp to adjust contrast, brightness, hue and color saturation.

See "Video" on page 58 for more information.

Audio

The DVR-3901 supports one audio channel pair, which can consist of one stereo pair or two independent audio channels. You can use the provided RCA jack to monitor mono audio. Audio proc amps are available on recording and playback. Use the proc amps to adjust gain and phase inversion.

See "Audio" on page 59 for more information.

Monitor Output

Monitor Video and Monitor Audio outputs are analog. Use the video monitor out to view time code, DVR status and audio meter.

Genlock

Use Genlock to lock the playback video to the selected video source on the DVR-3901. See "Genlock and DARS" on page 60 for more information.

Time Code

The DVR-3901 supports LTC input and output. The use of time code differs in different operation modes. See "Online Operation Modes" on page 65 for details.

Video Compression

The DVR-3901 uses the industry standard M-JPEG (baseline) video compression method. Closed captions and other VBI lines are compressed using M-JPEG and retained with the compressed video. See "Video Compression" on page 61 for more information.

Storage

Note

In Europe and Asia the 2.5 in. (6.35 cm) hard drive is described as 9.5 mm.

The compressed video, PCM audio, and time code are stored on two on-board 2.5 in. (6.35 cm) IDE hard drives. One or both hard drives can be connected online for real-time recording or playback. See "Storage" on page 62 for more information.

Controls and Operations

You can operate and control the DVR-3901 through the following methods:

Local Card-Edge Controls

Local card-edge controls let you customize configurations and settings and provide card status information and alarms. All the parameters are accessible at the card edge. See "Operation" on page 27 for more information.

CCS Pilot™ and CCS Navigator™

These PC GUI software packages can be used to control, configure and monitor various Leitch products. Please see www.leitch.com for more information. The NEO DVR-3901 can be controlled by all versions of Leitch CCS. All the parameters available at card-edge are accessible from the CCS software.

RS-422 Controls

The DVR-3901 responds to a RS-422 controller (for example an automation controller) through an RS-422 port using Sony protocol. It supporst a selection of Sony and Odetics™ commands. The DVR-3901 package includes a straight-through RS-422 cable. See "Remote Operation" on page 45 for more details.

PC Controls

A PC application using Sony protocol can control the DVR-3901 through the RS-422 port. An RS-232 to RS-422 conversion cable, included in the DVR-3901 package, should be used to connect the PC to the DVR-3901 RS-422 port.

See "Remote Operation" on page 45 for more details.

Ethernet Controls

In addition to RS-422 control, you can control the DVR-3901 through UDP/IP communication. This method supports the same commands as the RS-422 controls, but they are wrapped differently.

See "UDP Control" on page 49 for details on the UDP communication protocol.

Offline File Transfer

The DVR-3901's two drives can be put offline individually. Once a drive is offline, you can transfer video/audio clips on that drive in and out of the drive through the Ethernet port.

See "Offline File Transfer" on page 69 for details.

Operation Modes

The DVR-3901 operates in two different modes: Playlist mode and BVW/Odetics mode. It can be controlled by a RS-422 controller or an Ethernet controller in either mode.

See "Online Operation Modes" on page 65 for more details.

NEO-VR Command Center™ Application

Note

For more information about the more robust NEO-VR Command Center™, please contact your Leitch sales representative.

NEO-VR Command Center Lite™ is PC application software that provides a means to configure and control the DVR-3901 from a PC. The CD-ROM is attached to the inside back cover of this manual, and includes the NEO-VR Command Center Lite™ program, the NEO-VR Command Center Lite™ user manual in pdf format, and NEO-VR Command Center Lite™ online help. For information on installing NEO-VR Command Center Lite™, please see the user manual. If you do not have Adobe Acrobat™ installed on your system, see "Installing Adobe Acrobat Reader" on page 10 for installation instructions.

NEO-VR Command Center™ is the full version of the software that can only be enabled by a USB dongle plugged into the PC. It is dedicated to playlist mode operations and supports playlist generation, playlist editing, clip trimming, shotbox, and FTP. Read the Command Center manual from the Leitch website for more information.

Installing Adobe Acrobat Reader

Adobe Acrobat Reader is available on the NeoVR Command Center Lite Installation CD. To install the Acrobat Reader software from the Installation CD, complete these steps:

Use Windows Explorer to find the Adobe Acrobat Reader setup file, *rp500enu.exe*, on the Installation CD at this location:

third party\Adobe\rp500enu.exe

Double-click the *rp500enu.exe* file icon to start setup.

Follow the instructions that appear on the computer monitor.

Chapter 2

Installation and Removal

Overview

Caution

Before installation, please read the *NEO Safety Instructions and Precautions Manual*. This document contains important information about the safe installation and operation of NEO products.

Installation, navigation, configuration, and setup information is now included in the *NEO FR-3901, FR-3903, and FR-3923 Mounting Frames Installation and Operation Manual*. If your current NEO frame manual is Edition A, B, C, or D, you will need to download an updated version from the Leitch Web site (www.leitch.com) to access this information.

In this chapter, you can find information on the following topics:

- "Checking the Packing List" on page 12
- "Installing DVR-3901 Modules" on page 12
- "Removing DVR-3901 Modules" on page 12
- "Making Connections" on page 13
- "Setting Jumpers" on page 16
- "Upgrading DVR-3901 Firmware" on page 19
- "Correcting a Failed Upgrading Procedure" on page 23

Checking the Packing List

Note

In Europe and Asia the 2.5 in. (6.35 cm) hard drive is described as 9.5 mm.

Note

Older versions of DVR-3901 shipped with two 40 GB hard drives.

The NEO DVR-3901 module package includes these items:

- One DVR-3901-FM front module
- One DVR-3901-BM back module
- One *DVR-3901 Installation and Operation Manual* per order
- Two fixed 2.5 in. (6.35 cm) IDE 80 GB hard drives mounted on the NEO DVR front module
- One 10 ft (3.05 m) RS-422 cable
- One 6 ft (1.83 m) PC serial control cable (RS-232 to RS-422 conversion)
- Four mating connectors for AES and LTC ports

Installing DVR-3901 Modules

This module requires no specialized installation procedures. For general information about installing NEO modules, see your *NEO FR-3901, FR-3903, and FR-3923 Mounting Frames Installation and Operation Manual*.

Removing DVR-3901 Modules

This module requires no specialized removal procedures. For general information about removing NEO modules, see your *NEO FR-3901, FR-3903, and FR-3923 Mounting Frames Installation and Operation Manual*.

Making Connections

Note

The DVR-3901 can also be controlled by Ethernet cables over using UDP. For more information, see "UDP Control" on page 49.

Either RS-422 or PC serial cables can be used for connections on the DVR-3901.

Connecting Using a RS-422 Cable

The DVR-3901 is equipped with a 10 ft (3.05 m) long RS-422 cable. This cable has male connectors on both ends. Plug one end to the DB-9 connector on the back module and fasten the screws. The jumper J6 should be positioned according to "Setting Jumpers" on page 16. Figure 2.6 shows the RS-422 pinouts.

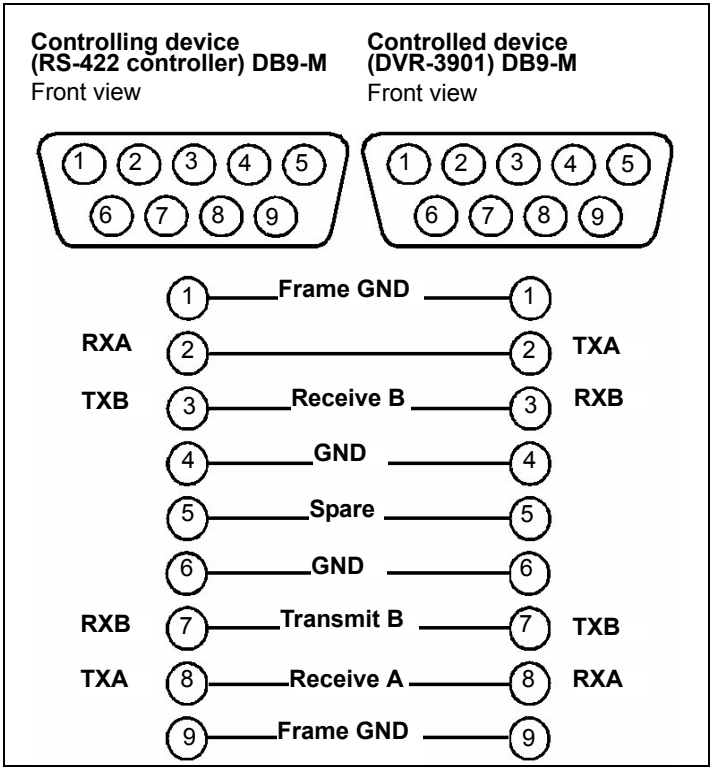

Figure 2-1. RS-422 Cable Pinouts

Connecting Using a PC Serial Cable

The DVR-3901 is equipped with a 6 ft (1.83 m) long PC serial control cable. This cable is male at one end and female at the other end. Plug the male end to the DB-9 connector on the back module and the other end to the PC serial port. (See Figure 2-2.)

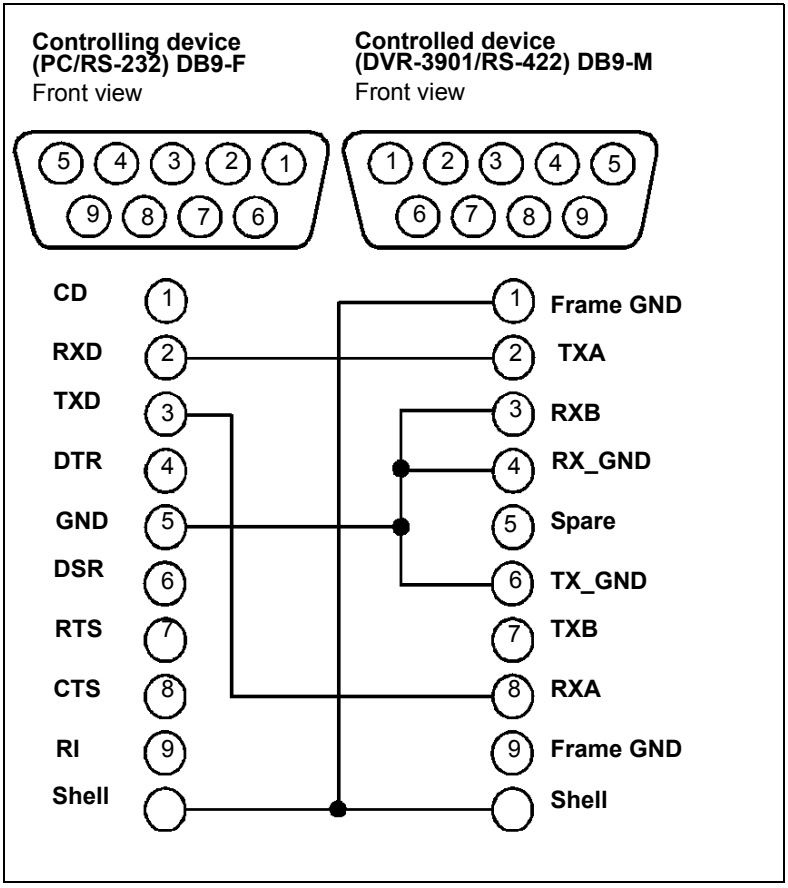

Figure 2-2. PC Serial Conversion Cable Pinouts

Fasten all the screws. The jumper J6 should be positioned according to "Setting Jumpers" on page 16.

AES/LTC Mating Connectors

Note

If you require more AES or LTC mating connectors, please contact your Leitch representative and request part number ‘Leitch audio 3F.’

The AES IN, AES OUT, LTC IN, and LTC OUT connectors are special 3-pin balanced connectors. Their mating connectors are included as accessories. The audio and LTC cables can be installed onto these connectors with a slot head screw driver. The polarities for signal wiring are shown on the connectors themselves.

For LTC cables, the NEO DVR-3901 supports both 600Ω or Low-Z/Hi-Z cables. See “Setting Jumpers” on page 16 for the correct impedance matching.

Setting Jumpers

To achieve your desired configuration, you may need to change the settings of some, or all, of the J6, J7, J8, and J9 jumpers. There is an on-board silkscreen describing the jumper settings.

Jumper Locations

The jumpers are located at the rear of the board. (See Figure 2-3 below.)

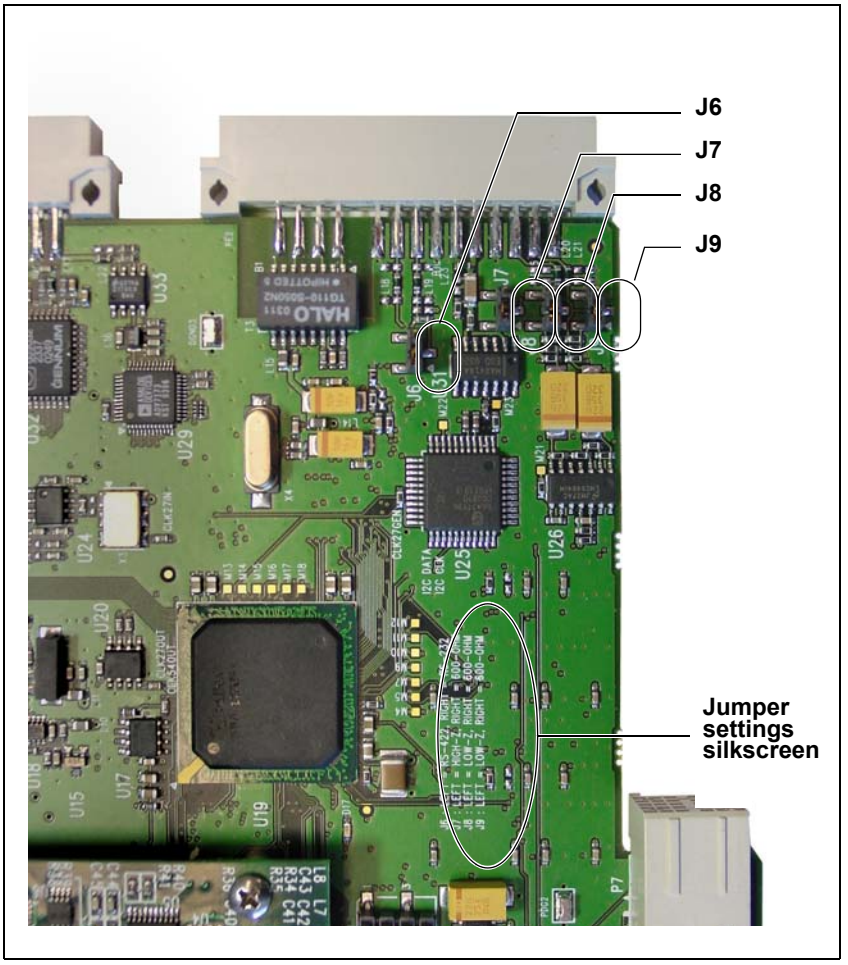

Figure 2-3. Position of Jumpers on the Board

RS-422 / PC Serial Cable Selection

Follow this procedure to set the **J6** jumper for either manual or automatic selection:

1. Locate jumper **J6** on the module. See Figure 2-3 on page 16.
2. Place a jumper on pins 1 and 2 to set the module for **RS-422** selection, or pins 2 and 3 to set the module for **PC serial** selection. See Figure 2-4 below.

Note
The white triangle on the module near the jumper pins indicates pin 1

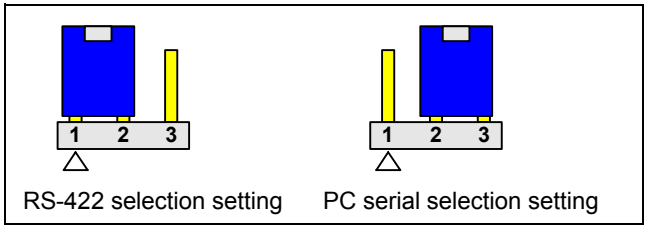

Figure 2-4. The **J6** Settings for RS-422 and PC serial selection

LTC Input Termination Selection

Follow this procedure to set the **J7** jumper for selecting either Hi-Z or 600Ω shunt impedance for the LTC input port:

1. Locate jumper **J7** on the module. See Figure 2-3 on page 16.
2. Place a jumper on pins 1 and 2 to set the module for **Hi-Z** selection, or pins 2 and 3 to set the module for 600Ω selection. See Figure 2-5 below.

Note
The white triangle on the module near the jumper pins indicates pin 1.

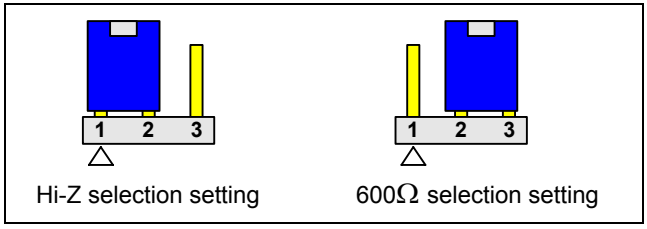

Figure 2-5. The **J7** Settings for Hi-Z and 600Ω selection

Terminating LTC Output Port (+) Termination

Follow this procedure to set the **J8** jumper for either Low-Z or 600Ω series impedance for the LTC output port (+):

1. Locate jumper **J8** on the module. See Figure 2-3 on page 16.
2. Place a jumper on pins 1 and 2 to set the module for **Low-Z** selection, or pins 2 and 3 to set the module for 600Ω selection. See Figure 2-6 below.

Note

The white triangle on the module near the jumper pins indicates pin 1.

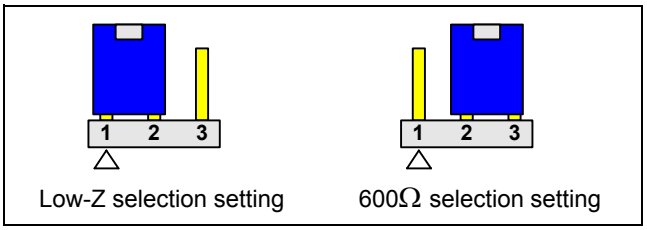

Figure 2-6. The **J8** Settings for Low -Z and 600Ω selection

LTC Output Port (-) Termination

Follow this procedure to set the **J9** jumper for either Low-Z or 600Ω series impedance for the LTC output port (-):

1. Locate jumper **J9** on the module. See Figure 2-3 on page 16.
2. Place a jumper on pins 1 and 2 to set the module for **Low-Z** selection, or pins 2 and 3 to set the module for 600Ω selection. See Figure 2-7 below.

Note

The white triangle on the module near the jumper pins indicates pin 1.

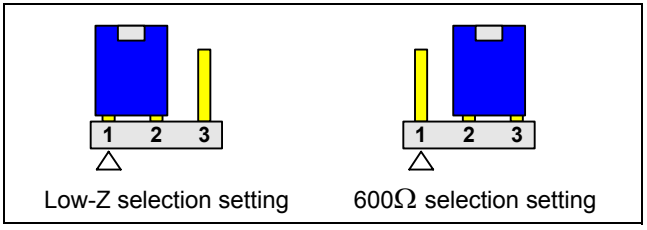

Figure 2-7. The **J9** Settings for Low-Z and 600Ω selection

Upgrading DVR-3901 Firmware

Firmware upgrading is a routine procedure that you must perform to install newer versions of software on the DVR-3901 module. Pilot, Co-Pilot, or Navigator software applications are required for this procedure. You can use either the Discovery or the drag-and-drop method. When performing the upgrading procedure, check the appropriate readme file to confirm which files are needed. Use care to ensure that you upload the correct files to the intended module.

If for some reason the upgrade fails, the module may not respond to controls and will appear to be non-functional. In that event, follow the procedures described in "Correcting a Failed Upgrading Procedure" on page 23.

Upgrading the Firmware (Discovery Method)

Follow these steps to upgrade the firmware using the **Discovery** method:

1. Download the most recent appropriate upgrade package from the Leitch Web site or from your CD-ROM, and then unzip the upgrade package.
2. If the affected module has not been discovered, perform the **Discovery** operation, as described in your CCS software application manual or online help.
3. Double-click the device icon.

   The **Configuration...** window opens. On the **Software Upgrade** tab, the **/slotx/boot** (where x is the slot number) directory appears in the **Select the device directory to transfer to:** field.
4. Click **Add,** and in the **Add Upgrade Files** box, browse and select the **boot** folder in the module's upgrade; click **OK**.

   The **Add Upgrade Files** box appears.
5. Select the file and then click **OK**.
6. Click **Perform Transfer** and then click **Yes**.

   This may take several minutes.
7. Wait for the message **File transfer to device succeeded** in the status bar.

If an **fl0** folder is included in the .zip file, the files within that folder must now be uploaded as shown below. (In some cases, the readme file may indicate other separate files must be uploaded instead.)

Follow these steps to upload the remaining files:

1. On the **Software Upgrade** tab, select the **/slotx/fl0** (where x is the slot number) directory in the **Select the device directory to transfer to:** field.
2. Click **Add,** and in the **Add Upgrade Files** box, browse and select the **fl0** folder in the module's upgrade package.
3. Click **OK**.
4. Select the files shown in the **Add Upgrade Files** box, and then click **OK**.
5. Select and delete unwanted files (for example: **vxWorks.lzs**) in the **Add upgrade files for transfer to device:** field by clicking **Remove**.
6. Click **Perform Transfer** and then click **Yes**.
7. Wait for the message **File transfer to device succeeded**.

   This may take a moment.
8. Click **Reboot Device** and then click **Yes.**
9. Wait 30 seconds, and then close the **Configuration...** box.

   The module name appears at the card edge.

Caution

You must delete unwanted files in the **Add upgrade files for transfer to device:** field before transferring the files. Otherwise, the upgrading procedure will fail.

Upgrading the Firmware (Drag-and-Drop Method)

Follow these steps to upgrade the firmware using the drag-and-drop method:

1. Download the appropriate most recent upgrade package from the Leitch Web site or from your CD-ROM, and then unzip the upgrade package.
2. If the affected module has not been discovered by your CCS software application, enter the Build mode, and then drag or copy and paste the module's device icon from the catalog folder into the **Network** or **Discovery** folder.
3. Right-click the device icon and then select **Properties**.
4. On the **NRO** or **Device** tab of the **Navigation Properties** box, enter the IP address of the frame that holds the module. (See Figure 2-8.)

Caution

Do not make changes in the third field (located above and to the right of the **Set Default** button.)

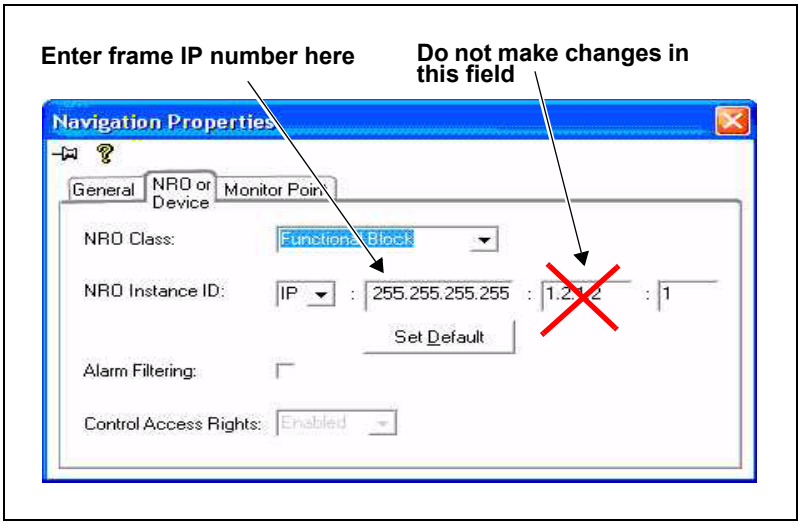

Figure 2-8. Navigation Properties Box

5. In the last field, enter the slot number of the module, and then close the window.
6. Double-click the device icon.

   The **Configuration...** window opens. On the **Software Upgrade** tab, the **/slotx/boot** (where x is the slot number) directory appears in the **Select the device directory to transfer to:** field.
7. Click **Add,** and in the **Add Upgrade Files** box, browse and select the **boot** folder in the module's upgrade.

8. Click **OK**.

   The **Add Upgrade Files** box appears.
9. Select the file and then click **OK**.
10. Click **Perform Transfer** and then click **Yes**.

    This may take several minutes.
11. Wait for the message **File transfer to device succeeded** in the status bar.

If an **fl0** folder is included in the .zip file, the files within that folder must now be uploaded as shown below. (In some cases, the readme file may indicate other separate files must be uploaded instead.)

Follow these steps to upload the remaining files:

1. On the **Software Upgrade** tab, select the **/slotx/fl0** (where x is the slot number) directory in the **Select the device directory to transfer to:** field.
2. Click **Add,** and in the **Add Upgrade Files** box, browse and select the **fl0** folder in the module's upgrade package.
3. Click **OK**.
4. Select the files shown in the **Add Upgrade Files** box, and then click **OK**.
5. Select and delete unwanted files (for example: **vxWorks.lzs**) in the **Add upgrade files for transfer to device:** field by clicking **Remove**.
6. Click **Perform Transfer** and then click **Yes**.
7. Wait for the message **File transfer to device succeeded**.

   This may take a moment.
8. Click **Reboot Device** and then click **Yes.**
9. Wait 30 seconds and then close the **Configuration...** box.

   The module name appears at the card edge.

Caution

You must delete unwanted files in the **Add upgrade files for transfer to device:** field before transferring the files. Otherwise, the upgrading procedure will fail.

Correcting a Failed Upgrading Procedure

Firmware upgrades may fail in the event of network interruptions, power failures, or if too much data is uploaded to the NEO module. Often, uploads of too much data can occur for one of the following reasons:

- The boot file (typically **vxWorks.lzs**) was accidentally uploaded during the fl0 procedure, instead of the boot procedure.
- Files were sent to the wrong NEO module.
- The particular hardware version of the module requires only some (but not all) of the available fl0 files.
- The upgrade .zip file was mistakenly sent to the module.

All of these problems can be corrected by re-installing the firmware while in a fail-safe mode, as described in the following pages. When you are performing this procedure, check the appropriate readme file to confirm which files are needed. Use care to ensure that you upload the correct files to the intended module.

Setting the Module to Fail-Safe Loader Mode

Follow these steps to set a NEO module to the fail-safe loader mode:

1. Remove the affected module from the NEO frame.
2. Press the **Nav** switch down while simultaneously pressing both the **Escape** and **Enter** buttons.
3. While still pressing the buttons and the navigation switch, reinsert the module into the frame and hold for approximately three seconds until the display on the module reads **Offline-H** (or **Offline-L**) **Upload Required**.

Upgrading the Firmware in Fail-Safe Mode

Note

To successfully upgrade the firmware, you must follow these steps in the exact sequence described.

Follow these steps to upgrade the firmware in the fail-safe mode:

1. Download the most recent appropriate upgrade package from the Leitch Web site or from your CD-ROM, and then unzip the upgrade package.

2. If the affected module has not been discovered by your CCS software application, enter the Build mode, and then drag or copy and paste the module's device icon from the catalog folder into the **Network** or **Discovery** folder.
3. Right-click the device icon and then select **Properties**.
4. On the **NRO** or **Device** tab of the **Navigation Properties** box, enter the IP address of the frame that holds the module. (See Figure 2-9.)

Caution

Do not make changes in the third field (located above and to the right of the **Set Default** button.)

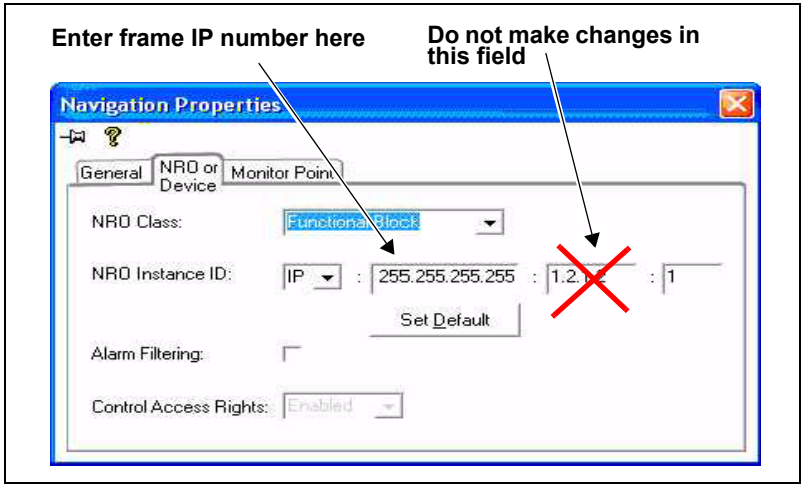

Figure 2-9. Navigation Properties Box

5. In the last field, enter the slot number of the module, and then close the window.
6. Double-click the device icon.

   The **Configuration...** box opens. On the **Software Upgrade** tab, the **/slotx/boot** (where x is the slot number) directory appears in the **Select the device directory to transfer to:** field.
7. Click **Add,** and in the **Add Upgrade Files** box, browse and select the **boot** folder in the module's upgrade.
8. Click **OK**.
9. Select the file and then click **OK**.
10. Click **Perform Transfer** and then click **Yes**.

    This may take several minutes.
11. Wait for the message **File transfer to device succeeded** in the status bar.

Rebooting the Module

Note

Some NEO modules will reboot automatically. In these cases, the **Reboot** button will be grayed out. During this time, the module's card-edge display will show the word **Rebooting** before the name of the module appears. These modules do not require the **fl0** file.

Caution

You must delete unwanted files in the **Add upgrade files for transfer to device:** field before transferring the files. Otherwise, the upgrading procedure will fail.

Follow these steps to reboot the affected NEO module:

1. Click **Reboot Device**, and then click **Yes**.

   After the module has rebooted, a message box advises you to wait until the device has rebooted.
2. Wait 30 seconds.
3. On the **Software Upgrade** tab, select the **/slotx/fl0** (where x is the slot number) directory in the **Select the device directory to transfer to:** field.
4. Click **Add**, and then browse and select the **fl0** folder in the module's upgrade package.
5. Click **OK**.
6. Select the files shown in the **Add Upgrade Files** box, and then click **OK**.
7. Select and delete unwanted files (for example: **vxWorks.lzs**) in the **Add upgrade files for transfer to device:** field by clicking **Remove**.
8. Click **Perform Transfer** and then click **Yes**.
9. Wait for the message **File transfer to device succeeded**.

   This may take a moment.
10. Click **Reboot Device** and then click **Yes.**
11. Wait 30 seconds, and then close the **Configuration...** box.

    The module name appears at the card edge.

Chapter 3

Operation

Overview

Note

For descriptions of the most-used functions of the DVR-3901 and the procedures for using them, see "Chapter 5: Functions and Controls of the DVR-3901" on page 57.

Installation, navigation, configuration, and setup information is now included in the *NEO FR-3901, FR-3903, and FR-3923 Mounting Frames Installation and Operation Manual*. If your current NEO frame manual is Edition A, B, C, or D, you will need to download an updated version from the Leitch Web site (www.leitch.com) to access this information.

This chapter describes how to operate the DVR-3901 module using card-edge controls.

The following topics are found in this chapter:

- "Operation Notes" on page 28
- "Navigating the Operator and All Lists" on page 29
- "Operator and All List Parameters" on page 30
- "Setup Parameters" on page 40
- "Alarms" on page 41
- "Module Status LEDs" on page 43

Operation Notes

Caution

Failure to observe these Operation Notes will result in accidental changes to the module's parameter settings.

When using the DVR-3901 module, observe the following operation notes:

- If you change parameters within 16 seconds after the NEO VR banner first appears on the VFD, your changes will not be saved. Parameter changes that you make after this 16-second delay will be saved and restored if the module loses power and must be restarted.
- Although your parameter changes seem to take effect immediately, the settings are only saved after 20 seconds of inactivity.
- When you set the **RstSetting** (Restore Settings) parameter to **Yes**, the module takes several seconds to reset all of the parameters. (**Setup** parameters are not affected by this restore setting mode.) See "Operator and All List Parameters" on page 30 for a list of the default settings that you activate when setting **RstSetting** to **Yes**.
- Changes in some parameters will cause additional changes in other parameters, or lock them out entirely. See "Functions and Controls" on page 57 for more information on these cross-functional parameter changes.

State Recovery Parameter Availability

The parameter settings for this module are automatically saved onto the 3901RES-E resource module installed in your NEO frame every five minutes. If a module should fail and be replaced with a cold spare, the state parameters can be automatically recovered. For more information on this feature, see the *NEO FR-3901, FR-3903, and FR-3923 Mounting Frames Installation and Operation Manual* (Edition E and above).

Navigating the Operator and All Lists

To navigate, and then view or change a parameter from the Operator or All Lists, follow these steps:

1. Open the front panel of the NEO frame.
2. Press any card-edge control to turn on the VFD screen.

   The message **NEO VR** appears. If a previous user has left the display at a different parameter name, repeatedly press the **Escape** button until the message **NEO VR** appears.

3. Push the **Enter** button.

   The name of the first parameter option in the list appears.

4. Push the **Enter** button again to access the options for the parameter displayed on the VFD screen.

   OR

   Press the **Nav+/Nav-** switch down repeatedly to view other parameters, and then press **Enter** to access an item's parameter options.

5. Press the **Nav+/Nav-** switch up or down to scroll through the different selectable parameter options, and then press **Enter** to select the value you want.

   OR

   Press the **Nav+/Nav-** switch up or down to adjust the numeric parameter value, and then press **Enter**.

6. Close the front panel of the frame to ensure the cooling system continues to operate properly.

Note

After several seconds of inactivity, a scrolling message will appear, describing the purpose of the currently selected parameter.

Operator and All List Parameters

Note

You can reset the default values for all of the parameters automatically via the **RstSetting** parameter (see page 39).

This complete list of parameter settings is arranged so that the settings most likely requiring changes are placed at the top of the list. Items on the bottom of the list are the least likely to require changing. Parameters with the designation [RO] are "read-only." An asterisk (*) indicates the default user range or value.

The All List is a long flat list of all the available parameters, arranged from the most-used to least-used. It is intended for a "Supervisor" security designation. The Operator List is a condensed version of the All List, and is intended for an "Operator" security designation. Table 3-1 shows all available parameters. Parameters accessed only from within the All List are shaded in gray.

See "Navigating the Operator and All Lists" on page 29 for instructions on navigating this list using card-edge controls.

Table 3-1. Operator and All List Parameters

Card-Edge ID	Parameter Name	Function	Options or User Range
AES_Prsnt [RO]	AES In Present	Detects the presence of AES Input signals	• Yes • No
AmonMode	Audio Monitor Mode	Sets the monitoring audio mode	• Left • Right • Mixed*
AudDither	Audio Out Dither Mod	Selects the Dithering Mode for all outputs	• None* • On
AudInSrc	Audio Input Source	Audio Input Source	• AES* • Embedded
ColorBar	ColorBarTestSignal	Color Bar Test Signal	• On • Off*
CompRatio [RO]	Compression Ratio	Video Compression Ratio	4.0 to 10.0 (clip)
Ctrl_Port	Control Port Sel	Selects the control port	• RS-422* • UDP

Table 3-1. Operator and All List Parameters

Card-Edge ID	Parameter Name	Function	Options or User Range
DARS_Src	DARS Source	Selects the DARS source	• None* • AES In
DARS Phase	DARS Phase Adjustmen	Adjusts the DARS phase	0* to 511 (wrap)
DARSLckErr [RO]	DARS Lock Error	DARS Lock Error	• Yes • No
DARSLocked [RO]	DARS Locked	AES output timing locked to DARS	• Yes • No
DiskOnline	Disk Online	Disk Online	• Both* • T: Only • B: Only • None
DiskSize [RO]	Disk Size	Returns the Disk size	0.0 GB to 655.35 GB
DiskStatus [RO]	Disk Status	Returns the disk status	• OK • Full • Malfunctn
DiskUsed [RO]	Disk Used Space	Returns the Disk used space	0.0% to 100.0%
DmxChSel	Aud DeMux ChPair Sel	Audio DeMux Channel Pair Select	• ChPair 1* • ChPair 2
DmxDBNCtrl	Aud DeMux DBN Control	Controls the handling of the DBN (Data Block Number)	• Alert* • Ignore
DmxErr [RO]	Aud DeMux Err Status	Returns the Error Status of the DeMuxed audio	• None • DBN • Chksum • Parity

Table 3-1. Operator and All List Parameters

Card-Edge ID	Parameter Name	Function	Options or User Range
DmxGrpPres [RO]	Aud DeMux Grp Present	Lists the audio DeMux groups that are present	• "- - - -" • "- - - 4" • "- - 3 -" • "- - 3 4" • "- 2 - -" • "- 2 - 4" • "- 2 3 -" • "- 2 3 4" • "1 - - -" • "1 - - 4" • "1 - 3 -" • "1 - 3 4" • "1 2 - -" • "1 2 - 4" • "1 2 3 -" • "1 2 3 4"
DmxGrpSel	Aud DeMux Group Sel	Selects audio demux group number	• Group 1* • Group 2 • Group 3 • Group 4
DropMode	Drop Mode Time Code	Set time code to drop frame mode	• On • Off*
DskFullErr [RO]	Disk Full Error	Indicates that the disk is full	• On • Off
DskMalErr [RO]	Disk Malfunction	Indicates that the disk has malfunctioned	• Yes • No
DvrOpMode	DVR Operation Mode	Sets DVR Operation Mode	• Playlist* • BVW/Odetic

Table 3-1. Operator and All List Parameters

Card-Edge ID	Parameter Name	Function	Options or User Range
EmbEn	Aud Embed Enable	Enables the audio embedder	• Yes* • No
EmbGrpSel	Aud Embed Group Sel	Selects the group number to embed to	• Group 1* • Group 2 • Group 3 • Group 4
FormatDisk	Format disk	Formats the selected disk(s)	• 0 = Top disk • 1 = Bottom disk • 2 = Both disks
GlStdFb [RO]	GL Video Std Fb	Returns the detected external reference signal standard	• NTSC • PAL-B • UnKnown
GlVPrsnt [RO]	GL Video Present	Returns the presence of the video signal from the external reference source	• Yes • No
HPhase	Horizontal Phase	Adjusts the horizontal timing	• 525 mode: 0* to 63.518 µs • 625 mode: 0* to 63.963 µs
IP_Addr	IP Address	IP address	String
IP_Mask	IP Mask	IP mask	String
IPGateAddr	IP Gateway	IP gateway	String
LoopPlayEn	Loop Playback Enable	Enables Loop Playback	• Yes • No*
LTC_Input	LTC Input Selection	Select LTC input	• Internal • External*
LTC_Prsnt [RO]	LTC Input Present	LTC Input Preset	• Yes • No

Table 3-1. Operator and All List Parameters

Card-Edge ID	Parameter Name	Function	Options or User Range
OSD_VUDisp	OSD VU bar Display	Determines on screen display VU meter type	• Off • VU • PPM* • VU / PPM
OSD_Opaque	OSD Opaqueness	On screen display opacity	0* to 15 (clip)
OSDFontSiz	OSD font size	On screen display font size	• Small • Large*
OSD_VUPosX	OSD VUBar Position X	On screen display horizontal position	0 to 40 (clip) (2*)
OSD_VUPosY	OSD VUBar Position Y	On screen display VU bar vertical position	• Small: 0 to 9 • Large: 0 to 8 (depending on font size) (6*)
OSD_VUGtop	OSD VU Green Bar Top	On screen display green bar top position	-40 to -3 (clip) (-18*)
OSD_VUYtop	OSD VU YellowBar Top	On screen display VU yellow bar top position	-20 to -3 (clip) (-6*)
OSDTxtDisp	OSD Text Display	Activate or deactivate on screen display's text display	• On* • Off
OSDTxtPosX	OSD Text Position X	On screen display horizontal position	• Small: 0 to 34 • Large: 0 to 19 (depending on font size) (2*)
OSDTxtPosY	OSD Text Position Y	On screen display vertical position	• Small: 0 to 13 • Large: 0 to 11 (depending on font size) (2*)

Table 3-1. Operator and All List Parameters

Card-Edge ID	Parameter Name	Function	Options or User Range
OSDUsrDisp	OSD User Display	Enable or disable clip name on OSD	• On • Off*
PB_Gain1	Playback Gain: Ch 01	Audio Gain adjustment for playback channel 01	-18.0 to 18.0 dB (clip) (0*)
PB_Gain2	Playback Gain: Ch 02	Audio Gain adjustment for playback channel 02	-18.0 to 18.0 dB (clip) (0*)
PB_Inv1	Playback Inv: Ch 01	Invert playback channel 01	• Yes • No*
PB_Inv2	Playback Inv: Ch 02	Invert playback channel 02	• Yes • No*
Pedestal	Pedestal	Adds a pedestal to the monitoring video output	• On * • Off
Ply_AP	Aud ProcAmp for Play	Audio ProcAmp for Play	• Enabled • Disabled*
Ply_VP	Vid ProcAmp for Play	Video ProcAmp for play	• Enabled • Disabled*
PlyAVDelay	Ply AudioVideo Delay	Play audio video delay	-40 to 40 ms (clip) (0*)
PlyY_Offst	VP Play Luma Offset	Video proc amp play luma offset	-448 to 448 (clip) (0*)
PlyY_Gain	VP Play Luma Gain	Video proc amp play luma gain	128 to 511 (clip) (256*)
PlyHue	VP Play Hue	Video proc amp play hue	-180 to 180 deg (wrap) (0*)
PlyC_Gain	VP Play Chroma Gain	Video proc amp play chroma gain	0 to 511 (clip) (256*)

Table 3-1. Operator and All List Parameters

Card-Edge ID	Parameter Name	Function	Options or User Range
PlyVPStart	VP Play start line	Video proc amp play start line	• Line 20 to 23 for 525 • Line 20 to 25 for 625 (line 22*)
PlyWhtClip	VP Play White Clip	Video proc amp play white clip	940* to 1019 (clip)
PlyBlkClip	VP Play Black Clip	Video proc amp play black clip	4 to 64* (clip)
PlyC_Clip	VP Play Chroma Clip	Video proc amp play chroma clip	448* to 507 (clip)
Rec_AP	Aud ProcAmp for Rec	Audio proc amp for record	• Enabled • Disabled*
Rec_VP	Vid ProcAmp for Rec	Video proc amp for record	• Enabled • Disabled*
RecY_Offst	VP Rec Luma Offset	Video proc amp record luma offset	-448 to 448 (clip) (0*)
RecY_Gain	VP Rec Luma Gain	Video proc amp record luma gain	128 to 511 (clip) (256*)
RecGain1	Record Gain: Ch 01	Audio Gain adjustment for recording channel 01	-18.0 to 18.0 dB (clip) (0*)
RecGain2	Record Gain: Ch 02	Audio Gain adjustment for recording channel 02	-18.0 to 18.0 dB (clip) (0*)
RecHue	VP Rec Hue	Video proc amp record hue	-180 to 180 deg (wrap) (0*)
RecInv1	Record Invert: Ch 01	Record invert channel 01	• Yes • No*
RecInv2	Record Invert: Ch 02	Record invert channel 02	• Yes • No*

Table 3-1. Operator and All List Parameters

Card-Edge ID	Parameter Name	Function	Options or User Range
RecMode	Recording Mode	Recording mode	• Normal* • Loop Rec • Frame Grab
RecC_Gain	VP Rec Chroma Gain	Video proc amp chroma gain	0 to 511 (clip) (256*)
RecVPStart	VP Rec starting line	Video proc amp record starting line	• Line 20 to 23 for 525 • Line 20 to 25 for 625 (Line 22*)
RecWhtClip	VP Rec White Clip	Video proc amp record white clip	940* to 1019 (clip)
RecBlkClip	VP Rec Black Clip	Video proc amp record black clip	4 to 64* (clip)
RecC_Clip	VP Rec Chroma Clip	Video proc amp record chroma clip	448* to 507 (clip)
RefVid	Reference Video	Selects reference video format	• CardRef* • SDI In • Freerun
SdiPrsnt [RO]	SDI IP Video Present	Returns the presence of the SDI input signal	• Yes • No
SdiStdFb [RO]	SDI IP Video Std Fb	Returns the detected SDI input video signal standard	• Unknown • D1-525 • D1-625

Table 3-1. Operator and All List Parameters

Card-Edge ID	Parameter Name	Function	Options or User Range
SloMoDisp	Slow Motion Display	Select slow motion, stepping, and still frame display options: • Normal: for each frame, show both fields interlaced • F1F1F2F2: for each frame, show one field at a time • F1 Only: for each frame, show field 1 only • 3:2 PuDn: for 24fps material in D1-525 mode show 3:2 pull-down when play speed is set to 0.8x of normal play speed	• Normal* • F1F1F2F2 • F1 Only • 3:2 PuDn
StdSetErr [RO]	StdSet mismatch	Standard set mismatch	• Ok • Err
ToneEnable	Tone Enable	Enables the audio tone generator	• On • Off*
ToneFreq	Tone Freq Set	Adjust the frequency of the selected audio tone generator	20 Hz to 20000 Hz (1000* Hz)
ToneGain	Tone Gain	Adjust the gain of the selected audio tone generator.	-40 dB to 0* dB
UseSrcTC	Use Source Time Code	Enables user source time code during playback	• On • Off*
VidBitRate	Video Bit Rate	Selects video bit rate	17000 kbps to 42000* kbps
VidStdSet	Video Std Set	Selects the line standard for the device	• D1-525 • D1-625
VLOV_EE	Video OP in EE Mode	Video output in EE mode	• Black • Freeze* • Color Bar

Table 3-1. Operator and All List Parameters

Card-Edge ID	Parameter Name	Function	Options or User Range
VPhase	Vertical Phase	Adjusts the vertical timing	• 525 mode: 0* Ln to 524 Ln • 625 mode: • 0* Ln to 624 Ln
RstSetting	RstSetting	Restore default settings	• Yes • No*
DvrPlyCtrl	DVR Play Control	Controls DVR playback functionality	• Stop • Play • EE On • Prev • Next • StepFwd • StepRev • ShutleFwd • ShutleRev • Jog Fwd • Jog Rev
DvrRecCtrl	DVR Record Control	Controls DVR record functionality	• Stop • Record
Setup	*Setup Parameters*	*Sets the parameters for display and usability (see "Appendix A: Tree View Navigation" for a complete list of Setup parameters and factory default settings)*	*Various*

Setup Parameters

Note

Setup parameters on a local or remote control panel may be different from the card-edge parameters described here.

You can modify the **Setup** parameters to configure the card-edge controls for your personal needs. The **Setup** section appears at the end of all three navigation lists and consists of these items:

- Alarms
- Navigation modes
- Adjustment modes
- Browse modes
- Scroll modes
- Display intensity
- Parameter descriptions
- Name
- FrameIP
- Sync full
- About mode

In Appendix A: “Tree View Navigation,” see the section “Setup” on page 86 for the structure of the **Setup** menu. See your *NEO FR-3901, FR-3903, and FR-3923 Mounting Frames Installation and Operation Manual* for more information on **Setup** items, including descriptions and operation notes.

Alarms

The DVR-3901 module has a default list of seven alarms. You can disable any alarm by modifying the **Alarms** parameter in the **Setup** section.

When you select **Alarms**, all of the active alarms are visible in the display, below **Config** (Configurations). If no alarms are active, only **Config** appears.

Alarm Synchronization

Alarm synchronization is available for this module if your NEO frame contains a 3901RES-E resource module that supports the feature. When active, alarm synchronization ensures that the alarm configuration settings of card-edge controls and the CCS control software and control panels are consistent.

If the DVR-3901 module is set for local control, the alarm settings will appear the same at both the card edge and via CCS, but the settings can only be changed using the card-edge controls. If the module is set for remote control, the alarm settings can be changed via both the card edge and CCS control software and control panels.

Alarm configuration settings undergo DejaView (state recovery) automatically. This means that when a module is hot-swapped, the alarm configuration for the new module is updated to the settings of the module that was previously in that slot. See "State Recovery Parameter Availability" on page 28 for more information.

Identifying the Cause of an Alarm

To identify the reason for an alarm, select the active alarm, and then press **Enter**. A scrolling message appears on the VFD describing the cause of the fault.

Enabling or Disabling an Alarm Parameter

To enable or disable an alarm parameter, follow these steps:

1. Select **Alarms**, then select **Config**, and then press **Enter**.
2. Select one of the alarm parameters, and then press **Enter**.
3. Press **Enabled** or **Disabled**.
4. Press **Enter** to activate the selection.

Restoring Default Settings

To restore the alarms to their default settings, follow these steps:

1. Select **Alarms**, select **Config**, and then press **Enter**.
2. Scroll down the list of alarms, and then select **Reset**.
3. Press **Enter** to activate the selection.

The following table lists the default alarms for the DVR-3901 module. You can enable or disable these settings, but you cannot change the level of the alarm.

Table 3-2. Default DVR-3901 Alarms

Card-Edge Alarm ID	Name of Alarm	Alarm Level	Meaning
DARSLckErr	DARS Lock Error	Major	DARS lock error
DmxErr	Demux Error	Major	Demux error
DskFullErr	Disk Full Error	Major	Disk full
DskMalErr	Disk Malfunction error	Major	Disk malfunction
GlVPrsnt	Genlock Video Present	Major	Loss of reference
SdiPrsnt	SDI Present	Major	Loss of sdi
STDSetErr	Video Standard Setting Error	Major	Mismatch among standard setting and feedbacks: VidStdSet, GlStdFb and SdiStdFb

Module Status LEDs

Alarms are usually logged and monitored within the available software control applications (for example, +Pilot Lite, Pilot or Navigator). See the appropriate software control user manual or online help for more information.

Table 3-3. LED Indicator Descriptions

LED	Description
SDI IN	• Green: SDI video input is present • Flashing Green: SDI input has a different video standard than VidStdSet • Red: SDI video input is absent
AES IN	• Green: AES audio input is present and DARSLckErr is No • Red: AES audio is absent, AudInSrc is selected to AES IN, and DARSLckErr is No • Off: AES audio is absent and AudInSrc is not selected to AES IN and DARSLckErr is No • Flashing Green: AES audio input is present and DARSLckErr is Yes • Flashing Red: AES audio input is absent and DARSLckErr is Yes
EMB AUD IN	• Green: Embedded audio input is present • Red: Embedded audio input is absent or in error and AudInSrc is selected to Embedded • Off: Embedded audio is absent and AudInSrc is not selected to Embedded
LTC IN	• Green: LTC input is present • Red: LTC input is absent and LTC_Input is selected to External • Off: LTC input is absent and LTC_Input is selected to Internal
GENLOCK IN	• Green: Reference video input is present and locked • Flashing Green: Ref Video input has a different video standard than VidStdSet • Red: Reference video input is absent or not locked

Table 3-3. LED Indicator Descriptions *(Continued)*

LED	Description
EE MODE	• Amber: DVR is in E-E Mode (e.g. in recording)
LNK/ACT	• Green: Network link is established • Flashing Green: Data communication is active • Off: Unit is not connected to the network
T:STATUS	• Green: Top hard drive is online • Flashing Green: Top hard drive is recording • Amber: Top hard drive is offline • Off: Top hard drive is not detected
B:STATUS	• Green: Bottom hard drive is online • Flashing Green: Bottom hard drive is recording • Amber: Bottom hard drive is offline • Off: Bottom hard drive is not detected

Chapter 4

Remote Operation

Overview

Note

For descriptions of the most-used functions and procedures of the DVR-3901 see "Chapter 5: Functions and Controls" on page 57.

This chapter describes how to operate the DVR-3901 Digital Video Recorder using UDP/Ethernet, RS-422 or a PC controller. (RS-422 or serial control is set via jumper J6. See "RS-422 / PC Serial Cable Selection" on page 17.)

The following topics are found in this chapter:

- "Control Port Assignment" on page 46
- "RS-422 Communication Protocol" on page 47
- "Motion Control" on page 51

Control Port Assignment

Note

The NeoVR Command Center automatically handles Control Port switching using Communication Settings and with the **Connect/Disconnect** button on the VR View. Please refer to the *NEO VR Command CenterUser Manual* for details.

You can connect one RS-422 controller, via the serial port, and one or multiple UDP controllers, via the ethernet port, to the DVR-3901. However, the DVR-3901 can only respond to one controller at a time. To prevent the DVR-3901 from receiving conflicting commands from different controllers, the DVR-3901 uses the following rules to assign control to a specific controller:

- On power up, DVR communication is in an idle state.
- If there is no communication on an active control port for 15 seconds, that control port will become inactive, and communication will go to an idle state.
- There are three ways to set an active control port:
  - If DVR communication is in an idle state, the DVR will grant access to the first controller that sends commands to it, and assign the corresponding control port to be the active control port.
  - To switch between an RS-422 port and a UDP port, set the **CtrlPort** command in Pilot or use the card edge controls to make that port active.
  - From any port, a controller can set a new active port by sending a **CtrlPort** command (Please refer to the *DVR-3901 Automation Control Developer's Manual*).

A controller can perform one of the following options to obtain control of the DVR:

- Issue a **get Ctrl_Port** status command

  The DVR will reply with 0 if the active port is RS-422 or the IP address of the active UDP controller if the active port is UDP.
- Force a connection by sending the **set CtrlPort** command

RS-422 Communication Protocol

The DVR-3901 implements RS-422 remote control over a DB-9 connector.

DB-9 connector

This 9 pin connector supports serial communication that conforms to the industry standard electrical interface, data format, and command protocol used by Sony and other manufacturers.

Electrical interface	TIA/EIA-422-B
Data format	• 38, 400 bits per second (38.4 kbps) • Asynchronous, full duplex communications
Command protocol	Odd parity, 8 data bits, 1 stop bit

Command Block Format

Table 4-1 describes the command block format for messages sent via the RS-422 Communication Protocol.

Table 4-1. Command Block Format

1 Byte		**1 Byte**	**1 Byte**	**N-2 Bytes**	**1 Byte**	**1 Byte**
Bits 7-4	**Bits 3-0**					
CMD-1	Data Count	CMD-2	DATA-1	. . .	DATA-n	CHECKSUM

CHECKSUM

Note

Only some motion commands are described in this manual. For the full list of commands supported, please refer to the DVR-3901 Automation Control Developer's Manual.

The final byte in these commands is always a modulo-256 checksum. This is the sum of all bytes of the command, not including the checksum byte itself. This checksum byte is included in Table 4-4 and Table 4-5 for commands that do not contain variable data. For example, the PLAY command consists of three bytes, 20 01 21. In this command, the third byte, 21, is the checksum. For commands and responses that contain variable data, the checksum byte is denoted in the table as uu.

Table 4-2. Summary of CMD-1 Categories

CMD-1 (hex)	Function	Direction
0	System control	To DVR-3901
1	System control response	From DVR-3901
2	Transport control	To DVR-3901
4	Preset and select control	To DVR-3901
6	Sense request	To DVR-3901
7	Sense response	From DVR-3901
A	Odetics "auto mode" extensions	To DVR-3901
C	NEO VR extensions	Bidirectional
F	NEO VR extensions	Bidirectional

UDP Control

The DVR-3901 implements UDP remote control over an Ethernet port.

UDP Communication Over Ethernet Port

You can use the external Ethernet port to control the DVR-3901 by sending serial control protocol commands encapsulated in UDP packets. UDP communication is conducted on port 331. This method requires that the content of server/client conversation bear the format outlined in Table 4-3:

Table 4-3. UDP Datagram Format

Field	Format	Description
ID	4 bytes, unsigned, MSB first	This field contains he ID number of a command or response. It should have different values for adjacent commands. For example, this field can be an incrementing count number modulo 2^32, unless the command is a retry of the previous command, for example, resulting from a response time out. The retried command will bear the same ID number as the original (failed) command.
CHANNEL	1 byte, unsigned	This field should be 0.
DATA0 - DATA(N-1)	N-byte, size depends on command	This field contains either a command from the controlling device or a response from the controlled device. Referring to Table 4-1, this field contains all the bytes in the command except the checksum.

Timeout & Retry Handling

The *controller* should ignore any responses that don't match the last command's identification. If the controller does not receive a response that matches the last command's identification within the protocol's timeout, it may either retry the failed command using the same identification number, or proceed to the next command using a new identification number.

If the *DVR-3901* receives two or more consecutive commands bearing the same identification numbers, it will only execute and respond to the first instance, after which it will simply return duplicates of the first response for every subsequent instance, without actually executing them.

This gives the controller the option of retrying unacknowledged commands without the danger of having them executed repeatedly by the DVR.

Motion Control

For the list of all commands supported by the DVR-3901, please refer to *DVR-3901 Automation Control Developer's Manual*. In BVW/Odetics mode, the DVR supports most of the Sony BVW-75 VTR commands and Odetics extension. In playlist mode, apart from the transport commands, it adds the command extension to support directory listing, title setting and playlist creation, chase mode, loop recording, frame grab and loop playback.

Both BVW/Odetics mode and Playlist mode support the following basic control commands.

ACK / NAK

The tables following often refer to an *ACK* or *NAK*. The recorder returns an ACK (acknowledge) or NAK (negative acknowledge) for commands that do not return a specific response containing, for example, time code or status information. There are different forms of a NAK for different communication errors.

Table 4-4. ACK and NAK Response Examples

	Data (Hex)	Explanation
ACK	10 01 11	Command recognized; recorder is attempting to perform the action called for in the command
NAK	11 12 01 24	Command not supported or command not recognized due to communication error
	11 12 02 25	Software overrun error; command cannot be processed when DVR is in a particular state
	11 12 04 27	Command had incorrect checksum
	11 12 20 43	Overrun error on serial line

Device Type Request

Table 4-5. Device Type Request

Command	Data (Hex)	Explanation
Device type request	00 11 11	• Playlist mode: 12 11 39 01 5D • BVW/Odetics mode: 12 11 20 25 68 for D1-525 12 11 21 25 69 for D1-625

Transport Commands

The DVR-3901 responds to transport commands with ACK or NAK.

Table 4-6. Transport Commands

Command	Data (Hex)	Explanation
STOP	20 00 20	
PLAY	20 01 21	Play forward at 1X play speed
REC	20 02 22	
FAST FWD	20 10 30	• Playlist mode: seek to last frame in play list • BVW/Odetics mode: go to the last frame of video, or the last frame of video in the current Odetics ID, if Odetics ID is used
STEP FWD	20 14 34	Advance one frame forward, up to OUT point
REWIND	20 20 40	• Playlist mode: seek to first frame in play list • BVW/Odetics mode:shuttle reverse at 30X play speed
STEP REV	20 24 44	Step one frame back, up to IN point

Table 4-6. Transport Commands *(Continued)*

Command	Data (Hex)	Explanation
CUE UP WITH DATA	24 31 ff ss mm hh uu	Cue to the specified frame; this is always relative to the first frame of the play list (For example, to cue to time 01:22:33:15: enter 24 31 15 33 22 01)
FULL EE OFF	20 60 80	Has no effect
FULL EE ON	20 61 81	Switch to pass-through mode, where video and audio at configured video inputs is visible at the video and audio outputs.

Variable Speed Commands

The following commands specify a playback speed. When one of these commands is issued, the recorder immediately starts playing at the specified speed.

The data byte(s) of the command conform to Sony's formula for speed data. One byte or two bytes of speed data may be provided. Two-byte speed data gives greater speed resolution, most useful at lower play speeds.

As a point of reference, 40 hex defines normal playback speed; 20 hex defines 1/10 play speed; 60 hex defines 10 times play speed.

Table 4-7. Variable Speed Commands

Command	Data (Hex)
Jog Fwd	21 11 xx uu 22 11 xx xx uu
Var Fwd	21 12 xx uu 22 12 xx xx uu
Shuttle Fwd	21 13 xx uu 22 13 xx xx uu
Jog Rev	21 21 xx uu 22 21 xx xx uu
Var Rev	21 22 xx uu 22 22 xx xx uu
Shuttle Rev	21 23 xx uu 22 23 xx xx uu

Time Commands

The following command retrieves a time code from the recorder. (See Table 4-8.)Within the response, the time information is formatted as *ff ss mm hh*, where *ff* is frames, *ss* is seconds, *mm* is minutes, and *hh* is hours. For example, time code 01:22:33:15 would be formatted in hexadecimal as 15 33 22 01.

Table 4-8. Time Code Command

Command	Data (Hex)	Response
Current Time Sense	61 0C 01 6E	74 04 ff ss mm hh uu

Status Sense Command

The data byte (xx) of this command specifies which status bytes the recorder will send. (See Table 4-9.) The most-significant four bits indicate the first byte to be returned. The least-significant four bits indicate the number of status bytes to send. For example, a data byte of 25 hex causes the recorder to send bytes 2 through 6.

Table 4-9. Status Sense Command

Command	Data (Hex)
Status Sense	61 20 xx uu

See Table 4-10 for the format of status data. Positions that contain no entry are always zero.

Table 4-10. Format of Status Data

Byte No.	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Busy					Hard Error		Local
1	1		Stop		Rewind	Fast Forward	Record	Play
2	1		Shuttle	Jog	Variable Play	0=fwd 1=rev	Still	Cue Complete
3	Auto Mode						Out Preset	In Preset
4		Full EE On			Review		Preview	Preroll
5		Insert						
6								
7								
8								
9							Preview Out Preset	Preview In Preset
0D	Start of Timeline	End of Timeline						

Chapter 5

Functions and Controls

Overview

This chapter describes the most-used functions of the DVR-3901 and how to customize them.

The following topics are found in this chapter:

- "Functions and Controls" on page 58
- "Online Operation Modes" on page 65
- "Offline File Transfer" on page 69
- "Exception Handling" on page 70
- "Firmware Upgrade" on page 70

Functions and Controls

The following section describes the most-used functions of the DVR-3901 Digital Video Recorder, and the procedures for using parameters to customize them.

Video

The DVR-3901 supports one digital video input via an SDI input port. The SDI input is 270 MHz, and complies with SMPTE259-C. The module outputs one channel of SDI video at 270 MHz and one composite video output for monitoring purposes. The video processing is 10-bit. The video compression and decompression method is 8-bit M-JPEG.

Selecting a Video Standard

Select between 525 or 625 lines for the DVR-3901 video system via the parameter **VidStdSet**. The SDI input and output must comply with the video system selection.

For SDI input, the card-edge LED “SDI IN” and the parameter **SdiPrsnt** indicate if SDI input is present. The parameter **SdiStdFb** indicates the detected video standard at SDI input. When the SDI input video standard is different than the **VidStdSet**, the **StdSetErr** will be turned on. The alarm is turned on when the “SDI IN” LED is flashing green.

Setting Color Bars

To show a 75% color bar at output, use the **ColorBar** parameter. This color bar only affects the output, and won’t be recorded onto disk.

For NTSC monitoring, pedestal setup is controlled via the parameter **Pedestal**.

If a loss of video occurs at the SDI input, the picture on the SDI output depends on whether the **VLOV_EE** parameter is set to black, 75% color bar or frozen.

Using Video Proc Amps

The DVR-3901 has two separate video processing-and-amplifiers (ProcAmps) built-in, one for the recording path and one for the playback path. They can be enabled or disabled by parameters **VP_Rec** and **VP_Play**. Once the parameter is set to Enable, you can control the luma gain, luma offset, chroma gain, hue, white clip, black clip and chroma clip level. Use **RecVPStart** and **PlayVPStart** to adjust the starting line where the video procamp takes effect.

Audio

The DVR-3901 supports one audio channel pair, which can consist of one stereo pair or two independent audio channels. For convenience, the first channel is referred to as “Left” and the second channel is referred to as “Right”.

Audio Inputs

Select between AES or embedded audio at SDI input for the audio channel pair using the **AudInSrc** parameter. The card-edge LED “AES IN” and the parameter **AES_Prsnt** indicate the presence of valid AES audio input. The card-edge LED “EMB AUD IN” and the parameter **DmxErr** show the status of embedded audio at the SDI input. You can use the parameter **DmxDBNCtrl** to turn off a data block number (DBN) error, as some embedder equipment does not generate DBNs that comply to SMPTE172M. Use the parameters **DmxGrpSel** and **DmxChSel** to select the desired audio group and channel pair to be de-embedded. The parameter **DmxGrpPres** indicates the presence of different audio groups.

The audio input, either AES or embedded audio, must be in PCM audio format. If the V-bit is set, as in the case of compressed audio input, the input audio is muted.

The AES input can be 16, 20, or 24-bit resolution and sampled at 32 kHz, 44.1 kHz, 48 kHz, or 96 kHz. The embedded audio input must be 20-bit embedded with a 48 kHz sampling rate. Audio recorded onto disk is 16-bit PCM format, sampled at 48 kHz. For playback audio, dithering is provided via the **AudDither** parameter.

Audio Outputs

One channel pair of audio is output to AES, embedded onto SDI video output, and output to the audio monitoring port. Use the **EmbEn** parameter to enable Audio embedding or **EmbGrpSel** to enable group selection. The channel-pair is embedded in the selected group on both channel-pair 1 and channel-pair 2. The embedder will overwrite the designated audio group if it exists.

Use the provided RCA jack to monitor mono audio. Select from the mono output options of "Left", "Right", or "Mixed Left and Right," using the **AmonMode** parameter.

You can generate audio tone at any time using the **ToneEnable** parameter. Use the **ToneFreq** and **ToneGain** parameters to adjust the tone frequency and gain. The tone will not be recorded when it is turned on.

Audio Proc Amps

There are two separate built-in audio processing-and-amplifiers (procamps), one for the recording path and the other for the playback path. They can be enabled or disabled by the parameters **AP_Rec** and **AP_Play**. Once a parameter is set to Enabled, you can adjust the audio level and invert the phase for the left and right channels.

Genlock and DARS

Note

DARS should always be 48 kHz sample rate.

Use the **RefVid** parameter to lock the video to the selected video source on the DVR-3901 using the Genlock circuit. This video source can be reference video input, SDI video input, or free running.

Adjust video timing via the **Vphase** and **Hphase** parameters.

For reference video input, the **GlStdFb** parameter is used to show the standard that has been detected, and **GlVPrsnt** indicates it is present. If PAL-M is being used as reference video, **GlStdFb** will indicate NTSC instead, but the SDI video output timing is still correct.

The DVR-3901 offers the capability of DARS (digital audio reference signal) locking so that the AES output complies to AES-11 standard. You can turn DARS locking on and off via the **DARS_Src** parameter. When you set the parameter to AES IN, the DARS input is shared with the AES IN port. The AES OUT timing will then lock to the DARS input. Adjust the **DARS_Phase** parameter to achieve your desired

phase on the AES output. Note that the DARS must be locked to the reference video, which could be a reference video input or an SDI input, depending on the RefVid setting. Otherwise, the **DARSLocked** status will show “Not locked” and the AES output will be in the wrong format.

Audio Video Delay

Use **PlyAVDelay** to adjust the audio delay in the range of [-1 to +1] video frame if there is a need to compensate for lip sync errors present downstream during playback.

Time Code

The DVR-3901 supports LTC input and output. For video standard 525, use **DropMode** to select drop frame or non-drop frame for time code generation. The use of time code differs in different operation modes. See “Online Operation Modes” on page 65 for details.

Video Compression

The DVR-3901 uses the ndustry standard M-JPEG (baseline) as its video compression method. You can find out the compression ratio from the **CompRatio** parameter. It can range roughly from 4:1 to 10:1. For the D1-525 system, the video lines 17 to 262 of each field are compressed using M-JPEG and stored; for D1-625, the lines are 23 to 310. Closed captions and other VBI lines are retained with the compressed video.

You can adjust the compressed video bit rate at any time using the **VidBitRate** parameter, which ranges from 17 Mbps to 42 Mbps. If the bit rate is changed during recording, the change takes effect in the next recording. During playback, video is decompressed seamlessly from clip to clip with various bit rate settings.

Storage

Note

In Europe and Asia the 2.5 in. (6.35 cm) hard drive is described as 9.5 mm.

The compressed video, PCM audio, and time code are stored on the on-board 2.5 in. (6.35 cm) IDE hard drives. A DVR-3901 has two hard drives installed.

Disk status reporting parameters include:

- **DiskSize**: Shows the online disk size and offline disk sizes
- **DiskStatus**: Shows the disk well-being
- **DiskUsed**: Indicates the percentage of disk occupied by media and system material

Table 5-1 shows the number of hours of video that a single 80 GB hard drive can store.

Table 5-1. Video Hours Available

Video Bit Rate (Mb/s)	Compression Ratio	Equivalent Quality	40 GB Hours
42	4	DigiBeta	4:00
34	5	BetaCam	5:00
28	6	BetaCam	6:00
24	7	BetaCam	6:50
21	8	BetaCam	7:50
19	9	S-VHS	8:40
17	10	S-VHS	9:30

Use **DiskOnline** to select which drive(s) are online, and which are offline.

Online Drives

Online drives record and play back video and accept transport, Odetics, and playlist commands coming from an RS-422 or Ethernet port. If both drives are online, they are merged as a single disk space and the merged drive is given drive letter M:.

A single recording can span two drives. The resulting file is split into two clips, one on each drive.

When a single drive is online, the drive letter is assigned T: for top drive, or B: for bottom drive. If only one disk is online, the other disk is offline.

Online disks are open for real time recording or playback. All Sony protocol motion control commands apply to the operation of the online disks (see "Motion Control" on page 51)

Offline Drives

Offline drives cannot accept transport, Odetics, or playlist commands. Offline drives can only be accessed through the Ethernet network.

To transfer files in and out of a disk, the selected drive must be offline.

Formatting Disks

Leitch formats and tests DVR-3901 drives before shipment. However, if you are installing new hard drives, you must format them prior to use. To format a drive, follow this procedure:

1. If the disk is offline, switch it to online mode using the card-edge parameter **DiskOnline**.
2. Format the disk using the card-edge control parameter **FormatDisk**.

   This command formats the online disk. It takes one or two seconds.

On Screen Display (OSD)

The DVR-3901 can display a text window, an audio meter window, and customizable strings.

Text Window

The text window displays the DVR's name, current time code and whether it is on or off line.

To enable the text window on the video monitoring output, use the parameter **OSDTxtDisp**. Set the position of the text window on the screen using the parameters **OSDTxtPosX** and **OSDTxtPosY**, and adjust its opacity using **OSD_Opaque**. You can also select between two sets of fonts (small: 8x16 and large: 12x18) using **OSDFontSiz**.

Audio Meter Window

The Audio Meter window displays VU meter, PPM meter or mixed VU/PPM (a VU meter with a top bar showing the PPM value). Enable the audio meter window through **OSD_VUDisp**.

When you select VU meter or PPM meter, a white bar on the top indicates the peak hold value. It holds for one second in 525-line standard and 1.2 seconds in 625-line standard.

The audio meter shows the audio levels for both the left and right channels. Each channel displays three sections, colored red, yellow and green. Adjust the level of top of yellow and top of green through **OSD_VUYTop** and **OSD_VUGTop**, respectively. Adjust the position of the audio meter window via **OSD_VUPosX** and **OSD_VUPosY and** use **OSD_Opaque** to adjust its opacity.

String Display

With an RS-422/Ethernet controller, the DVR-3901 can write strings (for example, a clip name) for display on the on screen display. Refer to the *DVR-3901 Automation Control Developer's Manual* for more information.

Online Operation Modes

The DVR-3901 operates in two different modes: Playlist mode and BVW/Odetics mode. Select the mode through the **DvrOpMode** parameter. The mode should be set properly before the DVR is used for recording. If the disk contains pre-recorded material, switching operating modes may cause undesirable effects, even when the mode is switched back to the original mode. These effects include video clip shuffling, time code errors, and even the loss of video clips.

In either mode, you can control the DVR-3901 with an RS-422 controller, or a PC application through the RS-422 or Ethernet port. Two cables are supplied for this purpose:

- RS-422 cable - Use this cable if you are using an RS-422 controller.
- PC serial control cable (does RS-232 to RS-422 conversion) - Use this cable when you are using a PC to control the DVR.

In either mode, you can record different clips with different video bit rate settings. You can adjust the parameter **VidBitRate** at any time. If you change the bit rate during recording, the change takes effect in the next recording.

In either mode, use the **SlowMoDisp** parameter to select different display capabilities when the video is played back at less than 1x play speed, including stepping forward and backward and still frames. The recommended setting is **F1F1F2F2** or **F1 Only** for smooth display.

Playlist mode

In Playlist mode, a clip is considered to be a sequence of video frames that are recorded from when you send a **Record** command until you send a **Stop** command. These frames are added to the directory where they appear as discrete clips that can be trimmed and deleted using a PC application or an edit controller. In Playlist mode, new recordings do not overwrite existing recordings. When the disk is full, the recorder cannot record more unless some space is freed by manually deleting video frames.

If time code is not present at the recorder's LTC IN connector when recording the video, the recorder assigns internal time code to every frame. By default, the internal time code starts at zero with each clip.

The time code that is recorded is called source time code. Set the **UseSrcTC** parameter to On if you wish to play out the source time code during playbackt. Otherwise, the DVR-3901 generates sequential time code which starts from zero at the beginning of the playlist.

By default, all the video clips are chained in the sequence of their relative time of recording to form a single playlist. As a result, all the recordings can be played from beginning to end seamlessly, as if they were from a single recording. This single playlist is referred to as the Full Spotbase.

When demonstrating or debugging the DVR, you can use the **DvrPlyCtrl** parameter for basic transport functions. In Playlist mode, this parameter only controls the active playlist. Upon power-up of the DVR unit, the active playlist is the full spotbase.

Note

Use the On Screen display (OSD) to view the current status of the DVR. Do not use the current state selected on the DvrPlyCtrl card-edge control, because this control does not receive feedback of the current status.

Loop Recording

To enable loop recording, switch parameter **RecMode** to **LoopRec**. When this is enabled, recording is only made to the available disk space, not the whole disk space. The available disk space can be viewed as a wrap-around tape. New video will be recorded onto the available disk space over and over. Old recordings outside of the available disk space won't be deleted or recorded over. Once the recording is stopped, the final video recorded is only as long as the available disk space. For example, before the loop recording, if the available space is three hours of video, after loop recording for 10 hours, when the recording is stopped, the DVR-3901 will hold the only the last 3 hours of the recording.

Frame Grabbing

Enable the Frame Grab feature by switching **RecMode** to **FrameGrab**. When in this mode, every time the DVR receives a Record command, it turns on recording status and grabs a single video frame. It appends this frame to the current clip. When the DVR-3901 receives a Stop command, the clip that contains individual frames is saved to disk.

Creating Playlists

With the help of NEO-VR Command Center, which you can purchase separately, you can construct playlists. Playlists can be assembled using selected clips and parts of selected clips. The constructed playlist forms a new sequence of video frames that can be played back seamlessly. Playlist construction is a basic form of nonlinear, cuts-only editing. Any mode can be switched to Playlist mode so that recordings can be managed in a nonlinear editing fashion.

In Playlist mode, you can enable the parameter **LoopPlayEn** to play the selected playlist in a loop-around fashion.

Deleting Clips

In Playlist mode, the only way to remove clips at card edge is by using the **FormatDisk** command, which empties the entire disk space.

To delete individual clips and portions of clips, leaving other clips intact, you must use the NEO-VR Command Center software.

BVW/Odetics Mode

This mode can operate in two ways: with and without the Odetics extension.

Without Odetics Extension

In BVW mode, the disk space is viewed as a virtual linear tape recorded with black and prestriped with 24 hours of time code. When a clip is recorded, if LTC input is present, the time code determines the clip's location on the virtual tape. If you record a clip with time code from hour 2 to hour 4, and another clip with time code from hour 5 to hour 6, you would have a one hour gap filled with black video between hour 4 and hour 5. If LTC input is not present, the time code automatically increments during recording, so you can cue to the time code location.

Note

when the disk is full, the disk may not actually contain 24 hours of video. If a full disk contains 6 hours worth of video, there will be 24-6=18 hours of black when playing back the whole 24 hours.

Only recorded material occupies disk space. When newly formatted, the disk is empty. The virtual tape can still be played back and is all black. If, as in the above example, you record a video clip from time code hour 2 to hour 4, and another from hour 5 to hour 6, your disk will only hold three hours of video. The physical location of a video on the disk has no relationship to that video's position in the 24 hour time code.

In BVW/Odetics mode, when you record material with the same time code as previously recorded video, the DVR-3901 deletes the previously recorded material with identical time codes. This deletion does not occur until after a recording is complete. Consequently, it is not possible to overwrite a video recording when the disk space available is less than the length of the video clip to be recorded; the disk could be filled before the recording has finished and before the overwritten video can be deleted from the disk.

To avoid the accidental loss of previously recorded material, keep a record of recorded material to consult before making new recordings.

With Odetics Extension

In this mode, the DVR-3901 supports Odetics extension commands. Each Odetics ID is identified as a clip that may occupy 24 hours of time code space. Recording, playback and storage otherwise work in the same way as when the Odetics extension is not used. Existing Odetics automation controllers are supported.

Switching Between BVW/Odetics Mode and Playlist Mode

Note

Be sure to use the FormatDisk command to clean up the disk right after switching to BVW/Odetics mode to ensure proper recording and playback.

Material recorded in BVW/Odetics mode is preserved in original clips and can be edited in a nonlinear way after switching to Playlist mode; however, the sense of 24 hour time code is lost and the disk simply holds individual video clips. Modifications in Playlist mode may result in the reshuffling and/or loss of video clips if switched back to BVW/Odetics mode. Video recorded in Clip Mode cannot be played back in BVW/Odetics mode.

Offline File Transfer

When one or both drives are put offline, you can transfer clips in and out of the DVR-3901's drives through the Ethernet port. The transfer may occur between two DVRs or between a DVR and a PC. You can use the NEO VR Command Center software to access all the file transfer capabilities. Please refer to the NEO VR *Command Center User Guide* for details.

Exception Handling

Loss of Power

If your DVR-3901 loses power during recording, it will lose all material captured since the recording started.

Loss of Video Input

If your DVR-3901 loses video input while recording, it will record black. If it is recording embedded audio with the video, it will record silence.

Loss of Video Genlock

If your DVR-3901 loses video genlock during playback ,and **CardRef** is selected for the **RefVid** parameter, the output video will freerun.

Firmware Upgrade

You can upgrade to new firmware using CCS Pilot or by card-edge ethernet connection. Leitch Customer Support staff will help you with your new firmware upgrades. After you download new firmware, reboot the module via CCS Pilot or by disconnecting it from and reconnecting it to its power source to continue the upgrade process. When the module is upgrading, the card-edge LEDs scroll. When the upgrading is complete and the scrolling stops, the module is ready to use.

Chapter 6

Specifications

Overview

The following tables list specifications for the DVR-3901 Digital Video Recorder module:

- "Serial Digital Video Input" on page 72
- "AES Audio Input" on page 72
- "Embedded Audio Input" on page 73
- "LTC Input" on page 73
- "Reference Video Input" on page 74
- "Serial Digital Video Output" on page 74
- "AES Audio Output" on page 75
- "Embedded Audio Output" on page 75
- "LTC Output" on page 76
- "Monitoring Outputs" on page 76
- "Hard Drive" on page 77
- "RS-422" on page 77
- "Power Consumption" on page 78
- "Ethernet Port" on page 78

Specifications and designs may change without notice.

Serial Digital Video Input

Table 6-1. Serial Digital Video Input

Item	Specification
Standard	SMPTE 259M-C, 525/625 component
Connector	BNC
Number of inputs	1
Level	800 mV ±10%
Impedance	75Ω
Return loss	>18 dB to clock frequency
CMRR	30 V pk-to-pk up to 60 Hz
Equalization	Automatic, up to 300 M coax

AES Audio Input

Table 6-2. AES Audio Input

Item	Specification
Standard	AES 3
Connector	Leitch 3-pin balanced connector
Number of inputs	1
Sample resolution	16/20/24 bits
Sample rate	32/44.1/48/96 kHz
Level	2 to 7 V pk-to-pk
Balanced impedance	110Ω

Embedded Audio Input

Table 6-3. Embedded Audio Input

Item	Specification
Standard	SMPTE272M-A
Sample resolution	20/24 bits
Sample rate	48 kHz

LTC Input

Table 6-4. LTC Input

Item	Specification
Standard	SMPTE12M
Connector	3 pin balanced
Number of inputs	1
Level	0.5 to 5 V pk-to-pk
Impedance	Hi-Z (>30 kΩ) or 600Ω
Common mode range	8 V pk-to-pk
CMRR	40 dB at 60 Hz

Reference Video Input

Table 6-5. Reference Video Input

Item	Specification
Standard	NTSC, PAL-B
Connector	BNC
Number of inputs	1
Level	1 V pk-to-pk, ±3 dB
Impedance	75Ω
CMR	5 V pk-to-pk
CMRR	>60 dB at 60 Hz
Return loss	>35 dB to 6 MHz

Serial Digital Video Output

Table 6-6. Serial Digital Video Output

Item	Specification
Standard	SMPTE259M-C, 525/625 component
Connector	BNC
Number of outputs	1
Level	800 mV
Impedance	75Ω
Return loss	>18 dB to clock frequency
Rise and fall times	0.75 to 1.5 ns
Drive capacity	up to 250 m (Belden 8281)
DC offset	within ±0.5 V
Overshoot	< 10%

AES Audio Output

Table 6-7. AES Audio Output

Item	Specification
Standard	AES 3
Connector	Leitch 3-pin balanced connector
Number of outputs	1
Sample resolution	20 bits
Sample rate	48 kHz
Level	4.5 V pk-to-pk
Jitter	±4 ns (0.025UI)
Rise/fall time	5 to 30 ns (10% to 90%)
Balanced impedance	110Ω

Embedded Audio Output

Table 6-8. Embedded Audio Output

Item	Specification
Standard	SMPTE272M-A
Sample resolution	20 bits
Sample rate	48 kHz

LTC Output

Table 6-9. LTC Output

Item	Specification
Standard	SMPTE12M
Connector	3 pin balanced
Number of outputs	1
Level (output into 1 kΩ)	• 2 V pk-to-pk Low-Z • 1.25 V pk-to-pk 600Ω
Impedance	Low-Z (< 25Ω) or 600Ω
Transition time	40 ± 4 µs measured at 10% and 90% amplitude
Overshoot/undershoot	<3%

Monitoring Outputs

Table 6-10. Monitoring Output

Item	Specification
Monitoring video connector	BNC
Monitoring audio connector	1 RCA jack

Hard Drive

Note

In Europe and Asia the 2.5 in. (6.35 cm) hard drive is described as 9.5 mm.

Note

Older versions of DVR-3901 shipped with two 40 GB hard drives.

Table 6-11. Hard Drive

Item	Specification
Hard drive installed	2 x 80 GB 2.5 in. (6.35 cm) IDE
Hard drive model	See the Leitch Web site or contact your service representative for a list of certified hard drive models

RS-422

Table 6-12. RS-422

Item	Specification
Protocol	Sony/Odetics subset
Connector	DB-9
Standard	TIA/EIA-422-B
Input impedance	>4 kΩ
Input common mode voltage	±7 V
Maximum input amplitude	10V common, 12V differential
Output impedance	<100Ω
Output amplitude	2 to 10 V
Output short current	<150 mA
Output power-off leakage current	<100 µA
Output rise/fall time	<0.1 UI or 20 ns
Output overshoot	<10%

Power Consumption

Table 6-13. Power Consumption

Item	Specification
Power-up	24.0 W max.
Record/play operation	19.0 W max.
Idle	16.4 W

Ethernet Port

Table 6-14. Ethernet Port

Item	Specification
Standard	IEEE 802.3u
Connector	RJ45

Appendix A

Tree-View Navigation

Overview

The Tree View is one of the three navigation modes available on the DVR-3901 modules. Unlike the other navigation modes, the Tree View is a multi-level list of parameters, arranged in the following main groups:

- "Audio" on page 81
- "Data" on page 82
- "Other" on page 83
- "Timecode" on page 83
- "Video" on page 83
- "Setup" on page 86

(See page 40 for more information on the use of **Setup** parameters, which govern the operation of the card-edge controls.)

This appendix consists of instructions for navigating the lists (see page 80) and the Tree View Parameter list.

Navigating the Tree View

To navigate and then view or change a parameter from the Tree View, follow these steps:

1. Open the front panel of the NEO frame.
2. Press any card-edge control to turn on the VFD display.

   The message **NEO VR** will appear as the banner on the card-edge display.
3. Press the **Enter** button.

   The first two items in the Level One list will appear.
4. Click **Nav-** (down) on the **Nav-/Nav+** switch to view more items in the Level One list.
5. Select the desired item in the Level One list, and then press **Enter**.

   This leads you to the Level Two list.
6. Repeat steps 3 and 4 to view more items in Levels Two, Three, and Four.
7. If the parameter is selectable, slide the bar to the desired parameter using the **Nav+/Nav-**switch.

   OR

   Select the desired item in the Level Four list, and then press **Enter**.

Once the Level Four parameter is set or viewed, you can leave the parameter in its current state, or return to the banner. To return to the NEO VR banner, repeatedly press the **Escape** button.

Close the front panel again after you have completed the procedure to prevent the frame from overheating.

Note

If you do not wish to make changes to your settings, return to the previously selected item in the list, and then press **Escape** to move up a level. See **SelPar Adj Mode** in the **Setup** section at the end of the Tree View to enable or disable this delayed adjust mode feature.

Note

After several seconds of inactivity, a scrolling message will appear, describing the purpose of the currently selected parameter.

Tree View Parameters

Unlike the Operator and All List navigation modes, the Tree View is a multi-level structure that includes all of the available card-edge parameters. Parameters with the designation [RO] are “read-only.” An asterisk (*) indicates the default user range or value.

See page 80 for instructions on navigating the Tree View.

Audio

DeMultiplx

DmxChSel
(Options: ChPair 1*, ChPair 2)

DmxDBNCtrl
(Options: Alert*, Ignore)

DmxErr [RO]
(Options: None, DBN, Chksum, Parity)

DmxGrpPres [RO]
(Options: "- - - -", "- - - 4", "- - 3 -", "- - 3 4", "- 2 - -", "- 2 - 4", "- 2 3 -", "- 2 3 4", "1 - - -", "1 - - 4", "1 - 3 -", "1 - 3 4", "1 2 - -", "1 2 - 4", "1 2 3 -", "1 2 3 4")

DmxGrpSel
(Options: Group 1*, Group 2, Group 3, Group 4)

Monitoring

AES_Prsnt [RO]
(Options: Yes, No)

AmonMode
(Options: Left, Right, Mixed*)

Multiplex

EmbEn
(Options: Yes*, No)

EmbGrpSel
(Options: Group 1*, Group 2, Group 3, Group 4)

Other

AudInSrc
(Options: AES* , Embedded)

DARS_Src
(Options: None*, AES In)

DARS_Phase
(Range: 0* to 511 [wrap])

DARSLckErr [RO]
(Options: Yes, No)

DARSLocked [RO]
(Options: Yes, No)

ProcAmp

AudDither
(Options: None*, On)
PB_Gain1
(Range: -18.0 to 18.0 dB [clip] [0*])
PB_Gain2
(Range: -18.0 to 18.0 dB [clip] [0*])
PB_Inv1
(Options: Yes, No*)
PB_Inv2
(Options: Yes, No*)
Ply_AP
(Options: Enabled, Disabled*)
PlyAVDelay
(Range: -40 to 40 ms [clip] [0*])
Rec_AP
(Options: Enabled, Disabled*)
RecGain1
(Range: -18.0 to 18.0 dB [clip] [0*])
RecGain2
(Range: -18.0 to 18.0 dB [clip] [0*])
RecInv1
(Options: Yes, No*)
RecInv2
(Options: Yes, No*)

TestGen

ToneEnable
(Options: On, Off*)
ToneFreq
(Range: 20 Hz to 20000 Hz [1000* Hz])
ToneGain
(Range: -40 dB to 0* dB)

Data

Other

Ctrl_Port
(Options: RS-422*, UDP)
IP_Addr
(Options: String)
IP_Mask
(Options: String)
IPGateAddr
(Options: String)

Storage

DiskOnline
(Options: Both*, T: Only, B: Only, None)

DiskSize [RO]
(Range: 0.0 GB to 655.35 GB)
DiskStatus [RO]
(Options: OK, Full, Malfunctn)
DiskUsed [RO]
(Range: 0.0% to 100.0%)
DskFullErr [RO]
(Options: On, Off)
DskMalErr [RO]
(Options: Yes, No)
FormatDisk
(Options: M: Online, T: Online, B: Online, None)

Other

DvrOpMode
(Options: Playlist*, BVW/Odetic)
LoopPlayEn
(Options: Yes, No*)
SloMoDisp
(Options: Normal*, F1F1F2F2, F1 Only, 3:2 PuDn)
RstSetting
(Options: Yes, No*)
DvrPlyCtrl
(Options: Stop, Play, EE On, Prev, Next, StepFwd, StepRev, ShutleFwd, ShutleRev, Jog Fwd, Jog Rev)
DvrRecCtrl
(Options: Stop, Record)

Timecode

Other

DropMode
(Options: On, Off)
LTC_Input
(Options: Internal, External*)
LTC_Prsnt [RO]
(Options: Yes, No)
UseSrcTC
(Options: On, Off*)

Video

Compress

CompRatio [RO]
(Range: 4.0 to 10.0 [clip])
VidBitRate
(Range: 17000 kbps to 42000* kbps)

Genlock

GlStdFb [RO]
(Options: NTSC, PAL-B, UnKnown)
GlVPrsnt [RO]
(Options: Yes, No)
RefVid
(Options: CardRef*, SDI In, Freerun)

Monitoring

OSD_VUDisp
(Options: Off, VU, PPM*, VU / PPM)
OSD_Opaque
(Range: 0* to 15 [clip])
OSDFontSiz
(Options: Small, Large*)
OSD_VUPosX
(Options: 0 to 40 [clip] [2*])
OSD_VUPosY
(Range: Small: 0 to 9, Large: 0 to 8 [depending on font size] [6*])
OSD_VUGtop
(Range: -40 to -3 [clip] [-18*])
OSD_VUYtop
(Options: -20 to -3 [clip] [-6*])
OSDTxtDisp
(Options: On*, Off)
OSDTxtPosX
(Range: Small: 0 to 34, Large: 0 to 19 [depending on font size] [2*])
OSDTxtPosY
(Range: Small: 0 to 13, Large: 0 to 11 [depending on font size] [2*])
OSDUsrDisp
(Options: On, Off*))
Pedestal
(Options: On*, Off)
SdiPrsnt [RO]
(Options: Yes, No)
SdiStdFb [RO]
(Options: Unknown, D1-525, D1-625)
StdSetErr [RO]
(Options: Ok, Err)

Other

RecMode
(Options: Normal* , Loop Rec, Frame Grab)
VidStdSet
(Options: D1-525, D1-625)

ProcAmp

Ply_VP
(Options: Enabled, Disabled*)
PlyY_Offst
(Range: -448 to 448 [clip] [0*])
PlyY_Gain
(Range: 128 to 511 [clip] [256*])
PlyHue
(Range: -180 to 180 deg [wrap] [0*])
PlyC_Gain
(Range: 0 to 511 [clip] [256*])
PlyVPStart
(Range: Line 20 to 23 for 525, Line 20 to 25 for 625 [line 22*])
PlyWhtClip
(Range: 940* to 1019 [clip])
PlyBlkClip
(Range: 4 to 64* [clip]
PlyC_Clip
(Range: 448* to 507 [clip])
Rec_VP
(Options: Enable, Disable*)
RecY_Offst
(Range: -448 to 448 [clip] [0*])
RecY_Gain
(Range: 128 to 511 [clip] [256*])
RecHue
(Range: -180 to 180 deg [wrap] [0*]
RecC_Gain
(Range: 0 to 511 [clip] [256*])
RecVPStart
(Range: Line 20 to 23 for 525, Line 20 to 25 for 625 [Line 22*])
RecWhtClip
(Range: 940* to 1019 [clip])
RecBlkClip
(Range: 4 to 64* [clip])
RecC_Clip
(Range: 448* to 507 [clip])

Synchroniz

HPhase
(Range: 525 mode: 0* to 63.518 µs, 625 mode: 0* to 63.963 µs)
VLOV_EE
(Options: Black, Freeze*, Color Bar)

VPhase

(Range: 525 mode: 0* Ln to 524 Ln, 625 mode: 0* Ln to 624 Ln)

TestGen

ColorBar

(Options: On, Off)

Setup

Alarms

Config

DARSLckErr (Options: Enable, Disable*)
DmxErr (Options: Enable, Disable*)
DskFullErr (Options: Enable, Disable*)
DskMalErr (Options: Enable, Disable*)
GlVPrsnt (Options: Enable, Disable*)
SDIPrsnt (Options: Enable, Disable*)
StdSetErr (Options: Enable, Disable*)
Reset

DARSLckErr **(if alarm has occurred)**
DmxErr (**(if alarm has occurred)**
DskFullErr (**if alarm has occurred)**
DskMalErr **(if alarm has occurred)**
GlVPrsnt **(if alarm has occurred)**
SDIPrsnt **(if alarm has occurred)**
StdSetErr **(if alarm has occurred)**

Nav Mode (Navigation Mode)

(Options: Oper List*, All List, Tree View)

SelPar Adj Mode (Adjust Mode)

(Options: Immediate, Delayed*)

Brws Mode (Browse Mode)

(Options: Param List, Param+Val*)

Scrl Mode (Scroll Mode)

(Options: Wrap*, Don't Wrap)

Disp Inten (Display Intensity)

(Options: 100%, 50%*, 25%, 12%)

Param Desc (Parameter Description)

(Options: Enabled*, Disabled)

Name

DVR-3901*

Frame IP (*see note for default settings)

(Options: IP Address, Subnet, Gateway)

Sync Full

(Options: No*, Yes)

About

(Options: GL_Hwld, FS_HwlD, Sw_Ver)

Note

*Default settings for Frame IP options are as follows:
IP Address (192.168.100.250), Subnet (255.255.255.0), and Gateway (192.168.100.250).

Appendix B

Servicing Instructions

Overview

Note

Older versions of DVR-3901 shipped with two 40 GB hard drives.

Note

Replacement of the DVR-3901 hard drives by anyone other than a Leitch Service Representative may void the warranty.

The DVR-3901 uses two 80 GB hard drives. Although Leitch recommends that replacement be done by a Leitch Service Representative, these drives can be field replaced.

When replacing the hard drives, only use drives that have been tested and recommended by Leitch. For a list of approved drives, please contact your Leitch sales representative

To replace one or both of the DVR-3901 hard drives, use the procedure for “Replacing a DVR-3901 Hard Drive” on page 88.

Replacing a DVR-3901 Hard Drive

To replace a hard drive on the DVR-3901 you will need the following items:

- Phillips #2 screwdriver
- DVR-3901 module
- Approved replacement hard drive(s)

Note

When replacing the hard drives, only use drives that have been tested and recommended by Leitch. For a list of approved drives, please contact your Leitch sales representative.

Procedure

1. Ensure that all power has been disconnected from the frame.
2. Remove the DVR-3901 from the frame using the extractor handle. (See your *NEO FR-3901, FR-3903, and FR-3923 Mounting Frames Installation and Operation Manual*.)
3. Remove the four screws visible from the top of the assembly. (See Figure B-1 below.)

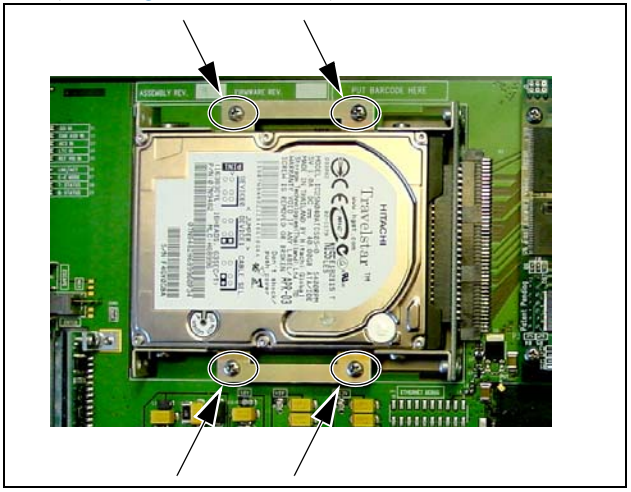

Figure B-1. Location of Screws for Step 3

4. Carefully, pull the complete hard drive assembly toward the front of the module until the assembly is touching the front edge of the cutout hole.
5. Lift the assembly up and away from the main board.

6. Remove the four (M3x5 PH) metric screws, located on the sides, from the assembly. These secure the hard drive(s) that is being replaced. (See Figure B-2 below.)

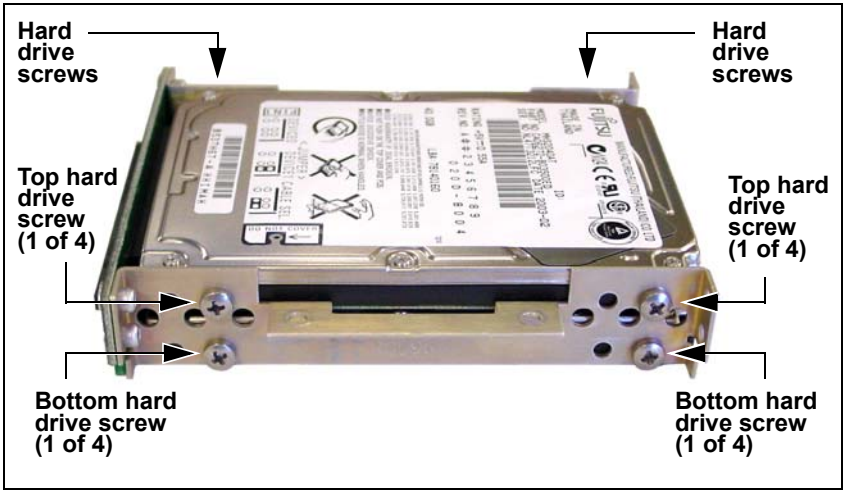
Hard drive screws
Hard drive screws
Top hard drive screw (1 of 4)
Top hard drive screw (1 of 4)
Bottom hard drive screw (1 of 4)
Bottom hard drive screw (1 of 4)

Figure B-2. Locations of the M3x5 PH Screws

Note

Follow the handling instructions located on the hard drive.

7. Carefully pull the hard drive out of the assembly.
8. The mounting of the new hard drive(s) and assembly is the reverse of the above procedure. Be careful to align the connector to the mating connector in the DVR-3901 module.

Note

After installing the new hard drives, remember to format the disk using FormatDisk command before the first use.

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